WORLD PETROLEUM

MAY 1960

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RESOURCES EXCEED $3,000,000,000

what's your best estimate?

. . . a quiz for refinery men who want to keep posted

QUESTION 1. At the close of World War II, the vast nation of India had two petroleum refineries with a total capacity of only 10,000 B/D. Today, one of these original production units and three new ones are turning out oil products for India at a considerably greater rate. What is the total crude capacity of India's four operating refineries?

a ▮▮▮▮▏ 43,000 B/D

b ▮▮▮▮▮▮▮▮▏ 76,000 B/D

c ▮▮▮▮▮▮▮▮▮▮▮▮▏ 107,000 B/D

d ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▏ 144,000 B/D

QUESTION 2. What per cent of India's present refining capacity has been designed, engineered and constructed by Lummus?

a % % % % 39%

b % % % % % % 63%

c % % % % % % % % % 91%

ANSWERS*: 1. *(c)—or 107,000 B/D—is the right answer.*

2. *(c) again—or 91% is correct. Lummus has built all three of India's postwar refineries, with a combined capacity of 97,500 B/D, through The Lummus Company Ltd. of London. Lummus Ltd.'s organization maintains a staff of over 400 specialists, and has engineered and constructed hundreds of process plants of all types and sizes, from India to Ireland. Lummus Ltd. is one of several international members of the Lummus group of companies which circles the globe. See Lummus on your next project.* *Statistics according to World Petroleum.

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THIS MONTH'S COVER

A bold impression by WORLD PETROLEUM's Art Director Charlotte Blass of one of Canada's Western Province wells, with snow-covered mountainous terrain in the distance.

Washington PIPE LINE

by Joseph B. Huttlinger

Petrobras Loan Discussed

Sen. Wayne Morse, D., Ore., has urged the U. S. Government to make a loan to Petrobras, the Brazilian government oil monopoly. "No conditions" as to private enterprise or government monopoly "should be attached to loans or other types of foreign aid," he said.

Mr. Morse is chairman of the committee's American Republics subcommittee. He reported that Latin Americans widely believe that U. S. oil companies are able to persuade U. S. officials to "block" any request for an oil loan to a government. This seems "to dictate the economic forms and policies to be followed by a foreign government" and stirs up "much criticism."

Morse said: "There are sound loans that can be made to Latin American government oil projects. They should be made." On Petrobras in particular, he said "the adamant refusal" of this government "even to consider public loans" is a mistake. This position is taken, he went on, "on the narrow dogmatic grounds that petroleum development should be carried out by private capital and that it could be and would be if Brazil changed its own policy of purely public development. However, this position ignores the facts that it is Brazil's oil and Brazil's policy which are involved and that the American attitude lends great credence to Brazilian nationalist charges of economic imperialism and intervention.

"I am not here advocating a loan to Petrobras. I am only advocating a willingness to consider such a loan on its economic and technical merits without reference to the fact that Petrobras is a government monopoly. If this consideration reveals that Petrobras could not adequately service a loan, then it should not be made. But if consideration indicates the opposite, then the loan should be made."

Jet Fuels Use Up In USA

About half the military use of oil products in the USA is in jet fuels, a rise from 44% in fiscal 1959. Thus, in fiscal 1959, some 327,000 b/d of jet fuel delivered out of total deliveries of 736,000 b/d. In fiscal 1960, a total of 334,000 b/d of jet fuel is to be bought out of an estimated total of 697,000 b/d. Plans for fiscal 1961, which starts next July 1, call for buying 354,000 b/d of jet fuel out of total of 705,000 b/d.

Gas Bill Still Stalled

The drive for a natural gas bill this year appears certain to be stalled in the battle between Congress and the White House as to which should move first. Both Democratic leaders in the House and Senate and President Eisenhower say they want a gas bill, to ease up the present federal price and other controls over natural gas producers. But both sides say it is up to the other to move first in a vigorous fashion in order for the drive for passage to succeed.

New steam was added to the drive by President Eisenhower, who wrote a letter to Rep. Page Belcher, R., Okla., in which he said: "I am ready and willing to support this legislation in this session with full vigor if those in control of Congress give some indication that they will join in this effort."

This statement, with its "if," was far less than Belcher had asked of the President in his letter. Belcher asked "some kind of message to the Congress advocating the passage of a gas bill this session." Democratic leaders in the House at once asserted the President's letter was not strong enough to bring action this year. In fact, they refused, at first, even to schedule hearings on the measure. Rep. Walter Rogers, D., Texas, a member of the commerce committee, which handles gas legislation, commented "a gas bill can pass the Congress this year if the President of the United States will send the bill to the Congress and request that it be enacted."

The President vetoed the bill that Congress sent him in February, 1956, but a year later, in his budget message called for passage of another measure. The veto, he explained at the time, was because of "arrogant" lobbying in behalf of the measure, but did not affect the merits of the matter. Until the Belcher letter, the President has had little else to say about the gas bill.

Gas producers were cheered by the President's letter, and set up speedy meetings to consider what to do next. Whether the industry leaders could convince the Congressional leaders to press ahead, was in doubt. Professional politicians, such as Lyndon Johnson, D., Texas, majority leader of the U. S. Senate see the gas bill as threatening to split the Democratic party and hence to be avoided in an election year.

US Oil Storage Report

The National Petroleum Council report "Petroleum Storage Facilities," prepared under the chairmanship of Mr. Robert L. Milligan, The Pure Oil Co., shows that as of March 31, 1959, there existed 1,585,948,000 barrels of petroleum storage capacity in the United States at 3,109 installations or locations having an aggregate of 25,000 barrels or more capacity. Of this total capacity 452,710,000 barrels were assigned to crude oil storage and 1,133,238,000 barrels to storage of refined petroleum products as follows:

Gasoline (finished and unfinished)—416,529,000 barrels; kerosine—55,844,000 barrels; jet fuel—29,169,000 barrels; distillate fuel oil—248,946,000; residual fuel oil—143,302,000 barrels; and all other products—239,448,000 barrels. A breakdown of this tankage by type of product, and by county and state, is contained in the report. Complete copies of the text of this report, including 42 statistical tables, may be obtained at the office of the National Petroleum Council, Suite 601, 1625 K St. N.W., Washington 6, D. C.

Future Demand Forecasts

Two recent studies have arrived at similar conclusions regarding the probable increase in domestic demand for petroleum products in the U.S.A. The Bureau of Public Roads has forecast a 20-year jump in motor fuel demand of 94% between 1956 and 1976, to 97,144 million gallons a year. The 1956 use was about 50,000 million gallons and the 1959 use about 55,000 million gallons. Assuming the demand for heating oil, lubricating oils, asphalt and waxes climbs in the same ratio, this would make total demand by 1976 about 17,000,000 barrels daily. The demand in 1959 was about 9,700,000 barrels daily.

A study by Resources for the Future, Inc., a nonprofit research group supported by the Ford Foundation, estimates demand by 1975 at about the same level. Sam H. Schurr, director of energy and mineral resources of the organization, foresees demand for petroleum and natural gas liquids rising over 20 years from 8,315,000 barrels daily in 1955 to 16,233,000 barrels daily by 1975, a rise of 95.2%.

The Schurr study is broader than the roads bureau forecast as it estimates total demand, while the bureau estimates only gasoline demand. The Schurr study also forecasts demand for natural gas, which was 9,614,000 million cubic feet in 1955 rising to 19,881,000 million cubic feet, a gain of 106.8%.

The study says that, "The demand that we estimate for 1975 for each of the primary energy resources would be satisfied from domestic supplies at costs which are not significantly higher (in constant dollar terms) than current costs."

Convert To Diesels

The U. S. Army plans to employ diesel power systems "in all vehicles" with more than 150 horsepower. Vehicles with less than 150 horsepower will use conventional engines.

Combat vehicles, except for the M-60 tank, now going into production have gasoline engines; but diesel engines are being tested, and some will be accepted for procurement in the year starting July 1, 1961, if the tests are successful.

A compression ignition for the 2½-ton cargo truck is currently being tested and test of a compression ignition engine for the five-ton cargo truck has recently been authorized.

Lt. Gen. Robert W. Colglazier, Jr., deputy chief of staff for logistics reported mileage much better in vehicles equipped with diesel engines. For example, the M-48A2 medium tank uses 3.50 gallons of gasoline per mile, and the M-60 battle tank uses 2.05 gallons of diesel fuel No. 2 or JP-4, per mile.

Oil's Use of Radio

The National Petroleum Council has adopted a report made by its Committee on the Use of Radio & Radar (1959). The study entitled "Petroleum Industry Use of the Radio Spectrum" was prepared under the Chairmanship of Mr. Morgan J. Davis, Humble Oil & Refining Co., assisted by Dr. R. D. Wyckoff, Vice-Chairman and a Committee of twelve recognized authorities in this field. The report points out that the petroleum industry, which provides 70% of our national energy consumption, has over 700 users in the Petroleum Radio Service operating over 44,000 radio transmitters other than microwave. In addition, 176 gas distribution companies operate nearly 18,000 such transmitters. Moreover, these petroleum and natural gas users have in operation, or planning stage, nearly 27,000 miles of microwave system incorporating 1,200 stations. In its 40 page printed report the Radio & Radar Committee discusses in detail the utilization and importance of radio in offshore operations, petroleum exploration, drilling and production, pipeline operations, refinery operations, marketing, marine transportation, aircraft radio, and the petroleum use of radar and radiolocation. Complete copies of this report may be obtained at the office of the National Petroleum Council, Suite 601, 625 K St., N.W., Washington 6, D. C.

1959 Pipeline Construction

The petroleum industry laid 751 miles of crude lines and 1,278 miles of products lines at a total cost of $88,866,000, it is reported by the Committee for Oil Pipe Lines. Another 79 miles of crude lines were converted to products service.

In 1958, some 4,127 miles of new line was completed and 398 miles of conversions at a cost of $215,612,000.

The most important crude oil line built in 1959, the committee said, was the 120-mile eight- to 20-inch Shell Pipe Line Corp.'s Delta System laid through the marshes and swamps of South Louisiana for moving delta offshore production to its Norco, La., refinery near New Orleans.

CAMERON TYPE "F" GATE VALVES GIVE MORE SERVICE FOR LESS MONEY

THIS IS THE REASON –

Cameron Type "F" Gate Valves for API service have reduced operating cycle costs to the lowest of any valve in similar service.

HERE'S HOW –

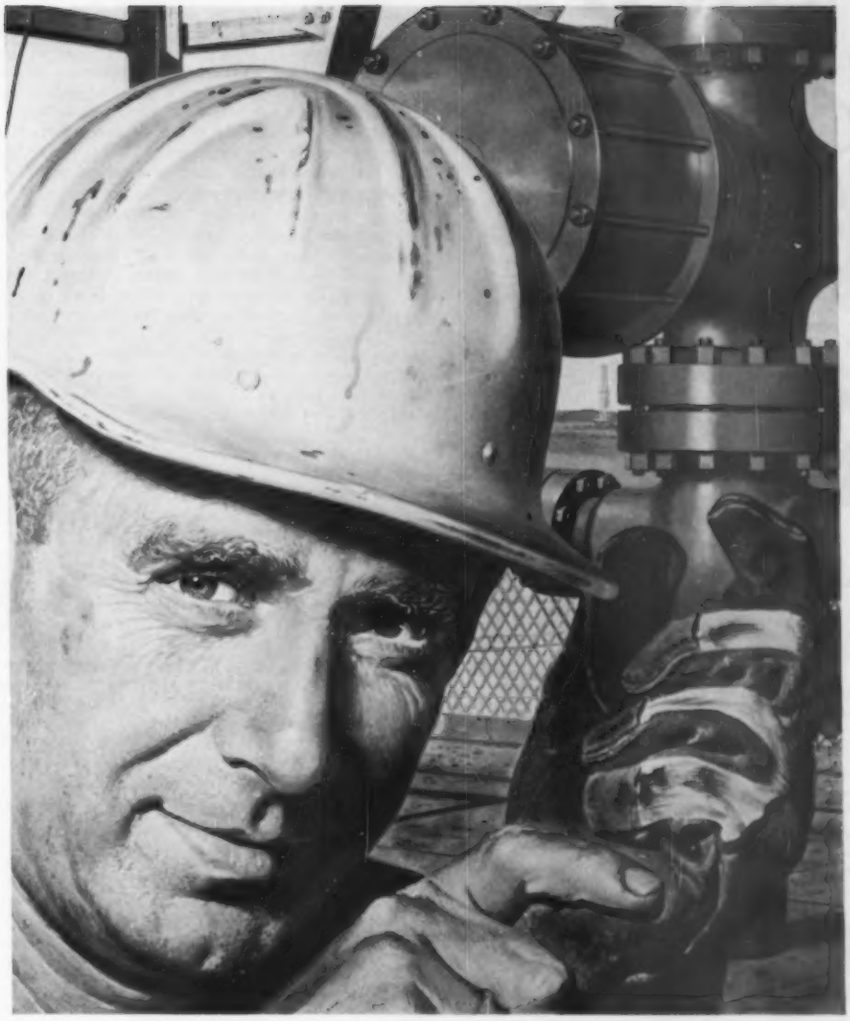
The rotating seat design found only in Cameron Type "F" Gate Valves exposes a new sealing pattern each time the valve is operated. Old design concepts are based on wedge fits to increase gate or plug contact pressure, viscous lubricants to bridge abrasions and reduce inherent friction, soft seals, or combinations of these conventional solutions to a tough problem. After extended tests and evaluation of every contemporary valve for API service, a summary revealed that all valves had one common characteristic. The down stream seat showed the most wear—maximum erosion always occurred in the same point—where pressure was first released in opening or where pressure was finally pinched off in closing.

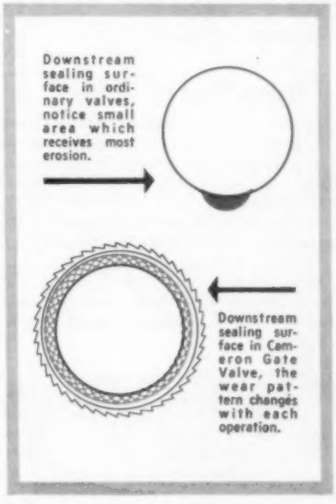
Then a new idea was conceived. Rotating the seat a fraction of a turn each time the valve was opened and closed would present a new surface at the critical point of greatest wear. This principle is the central feature of the Cameron Type "F" Gate Valve.

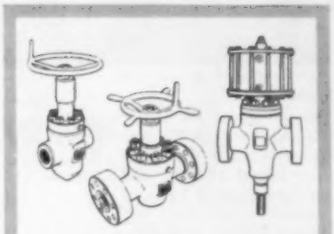
WHAT ABOUT COST?

All marketable valves when purchased must hold and release pressure. But purchase price does not represent total cost to use a valve. To purchase price must be added operating cost (continuous lubrication, frequent and difficult repair, slow operation) for the useable life of the valve. Divide this total by the number of times the valve is operated and you have a true picture of the original purchase. Actually you are buying operating cycles.

If you want the most operating cycles without maintenance—the lowest cost per cycle during the entire life of the valve no matter how tough the service, try Cameron Type "F" Gate Valves.




Downstream sealing surface in ordinary valves, notice small area which receives most erosion.
Downstream sealing surface in Cameron Gate Valve, the wear pattern changes with each operation.



Cameron Gate Valves are available in sizes from 2 to 6 inches, and pressures to 15,000 psi, including manually or pressure operated models (hydraulic or pneumatic) for remote controls and automated circuits.

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Setback To Liquid Methane Hopes?

Official hints have been given that the hopes built up of commercial deliveries of liquefied methane may have been premature. The first came from the Paymaster-General in a House of Lords Debate on the Coal Industry Bill, when he said there had been a number of trial shipments "and there the matter stands for the present." It was an experiment asked for by the gas industry that was worth carrying out "and it was our duty to carry it out irrespective of whether eventually that form of fuel would be used or not." Pressed as to whether this meant that for the time being there was no intention of further imports, Lord Mills replied: "I will put it this way—there is no such proposal before the government at this time."

In the House of Commons the Minister of Power stressed that the experiment would call for a very high degree of critical examination "both on grounds of commercial merit and on grounds of raw material use in the industry." On the point of detriment to the coal industry, he argued that if imported gas enabled the gas industry to compete more effectively, such imports would not harm coal, but would be to its great benefit.

No mention was made in either debate of the proposal to build one 20,000-ton or, more likely, two 10,000-ton methane carriers which the Gas Council chairman said last October it was hoped to present to the government "within a few weeks."

In March the "Methane Pioneer" made the last of its seven trial voyages, during which some 14,000 tons of methane were brought from Louisiana to the North Thames Gas Board at Canvey Island (Essex) and converted to town gas. All the Gas Council has said is that the trials had been completely successful and had provided valuable information for the consideration of possible large-scale operations. Meanwhile the vessel has been laid up at a British port pending a decision on its possible assignment to other service.

British Hydrocarbon Chemicals

Plans to build three new major plants at Grangemouth at a cost of £5 million are announced by British Hydrocarbon Chemicals Ltd.; jointly owned by British Petroleum and Distillers. One of these will more than double the existing capacity for butadiene and the other two new plants will be for the manufacture of methanol and ethylene dichloride. All are scheduled to be commissioned in 1961.

Severnside Petrochemical Plans

Since announcing the first phase of planning for its new Severnside (Bristol Channel) chemical plant (London Letter, April, 1960), Imperial Chemical Industries' heavy organic chemicals division has commented that, as it is based on ethylene piped from Esso's Fawley refinery, this suggests a departure from its present naphtha-pyrolysis method of producing ethylene.

This apparent departure, it is explained, is brought about and dictated by the need to extend manufacture as rapidly as possible under the favorable conditions obtaining. It represents the marriage of two opportune factors: Esso's helpful assistance in contracting to supply 40,000 tons a year of ethylene and the sanguine view taken by ICI of existing and future market trends for olefines and their derivatives, both inside and outside the company. In other words, the basis for petrochemical operations was there to be grasped—and it was grasped.

Later, when the demand for other olefines is established and when ethylene offtake is great enough to support a large olefine plant, ICI explains that it is likely to return to the manufacture of further quantities of ethylene by naphtha-pyrolysis. Severnside, in the meantime, by rapidly expanding ethylene utilization and indirectly promoting much intensified propylene utilization, will be no more than a logical extension of ideas conceived during the war and first put into practice with the start-up in 1951 of No. 1 olefine plant at Wilton Works. There, ethylene production is now 100,000 tons a year, and this is being increased during 1960, with modest capital expenditure, by not less than 20%.

Resurgence In Equipment Orders?

It may be that the first clear sign of a revival of orders for material and equipment placed in the U.K. by oil companies is to be seen in the figures for 1959 collated by the Oil Companies Materials Association. Though the total, at £117.3 million, still represents a decline of £4.8 million (3.5%) compared with 1958, the decline in 1958 compared with 1957 was high at £12.0 million (8.9%). The annual totals (in £ million) over the last five years have been: 1955, £123.5; 1956, £143.7; 1957, £134.1; 1958, £122.1; and 1959, £117.3; making an average of £130.1 million, a not insignificant contribution to the national economy, especially as these totals exclude the value of tanker orders.

A propitious feature may be the fact that the quarterly total for October-December 1959 of £34.1 million is the higher since the third quarter of 1957. It represents a rise of £1.5 million (4.8%) over the same period of 1958. Thus the first quarter of 1960 total will have added interest to see if this sign of resurgence is confirmed.

The values of the leading categories of materials in 1959, in £ millions (and the differences from 1958) were as follows: bulk chemicals, 25.6 (+0.9), a new record; tubulars, pipe fittings and valves, 12.1 (—2.9); automotive equipment, 10.6 (+3.1), another new high record; and specialized drilling and production equipment (including casing, tubing, and the like), 10.5 (+0.1).

Declines are also still to be seen in electrical equipment, 5.4 (—3.2); specialized refining equipment (excluding pumps and valves), 3.1 (—4.9); and ferrous and non-ferrous plates, sections, etc. 2.6 (—5.4).

Oil Mission To Visit Britain

The Organization for European Economic Co-operation has sponsored a technical mission of 60 European experts to study petroleum distribution facilities, techniques and equipment in Belgium, France, Germany, Great Britain and Italy. The tour will last from May 15 to June 11, of which May 22-27 will be in Britain, and the arrangements for the latter are being made, at Board of Trade request, by the Council of British Manufacturers of Petroleum Equipment. The mission will include 15 British members, probably comprising 10 equipment manufacturers and five oil company executives.

Shell To Make Polydiene Rubbers

Shell Chemical Co. is starting work immediately to establish "substantial" UK capacity for the manufacture of the new polydiene synthetic rubbers based on Royal Dutch/Shell research and development. Representative types are polybutadiene and polyisoprene—the latter is already made commercially by Shell in the US—and limited suppplies for trade evaluation in the UK will be available shortly. A similar project for Holland is announced by Shell Nederland NV.

Safety of A Nuclear Tanker

Atomic ships can be built and operated within acceptable safety standards. This is the main general conclusion in the "Report of the Committee on the Safety of Nuclear-Powered Merchant Ships," an independent panel of experts appointed to advise the British Minister of Transport on the problems arising at sea and in port.

The report is a most comprehensive one and includes the points on which it is felt international agreement is essential. At present the only ships seen as having any prospect of economic nuclear propulsion are large passenger ships or tankers having shaft horsepowers of 20,000 or more. On the question of carrying "dangerous cargoes," no objection is seen to the carriage of petroleum. The possible effects of reactor accidents are considered from all aspects: far out at sea, within 25 or 10 miles of land, and operations in coastal waters and ports. A recommendation on which emphasis is laid is that, unless a ship has two or more reactors capable of independent operation, arrangements shall be provided whereby the ship can be propelled at a navigable speed for a period of not less than five days should nuclear power not be available. There should also be an independent emergency source of electric power.

The committee's recommendations have since been accepted by the government "as an excellent basis for legislation in due course."

8-unit Woodfield Flow Boom Equipment installed at Thames Haven, Essex.

Largest Tanker Up the Thames

On her recent maiden voyage, the 65,000 dwt "Olympic Challenger" berthed at London and Thames Haven Oil Wharves recently completed No. 10 jetty and discharged 48,500 tons of Kuwait crude. She was the largest ship ever to sail up the Thames.

This new jetty, like the modernized earlier jetties, is equipped with the Woodfield Flow Boom system, each unit comprising four 12-in. diam. booms and four of 8-in., all 40-ft long. Discharging capacities are upwards of 1,500 tons/hour per 12-in. boom and 500 tons per 8-in. The most interesting point about the "Olympic Challenger" operation is that the installation operated successfully under conditions of a 21-ft spring tide and full free-board; and the manifold rise and fall went through a 41-ft range. The operation was controlled satisfactorily by push-button both from jetty level and high up in the structure.

British Equipment Notes

The £116,000 contract for rotating disc contactors which *John Thompson (Wolverhamption) Ltd.* has obtained for the Petroleos Brasileiro Duque de Caxias

a better life rolls his way

Once the people of his village had only the barest necessities of life—whatever products they could make themselves. Lack of transportation prevented trade and the progress that comes with trade.

Then great bulldozers, scrapers and cranes went to work. Soon a broad new road pierced the jungle. Now trade flourishes. From farms and factories miles away, trucks bring food, machinery, building materials, clothing—the many good things of modern life.

The power for equipment that builds roads, and for the vehicles that travel them, comes from oil. Assuring a steady flow of oil is a prime concern of Standard-Vacuum. In Asia, Africa and the lands of the Pacific, Stanvac continually searches and drills for oil, then refines and markets many finished petroleum products. Stanvac is proud of its role in helping the peoples of these areas in their forward march.

STANDARD-VACUUM OIL COMPANY POWERS PROGRESS

White Plains, New York

refinery represents the largest in the company's history apart from those involving boiler making or nuclear power station equipment. The contactors, made under license from Shell, are the largest yet designed and the first to be made in the UK. Each vessel weighs 85 tons and is 55 feet long and 9 feet in diameter.

Four diesels supplied by *The English Electric Co. Ltd.* are installed in Shell International's new mobile drilling platform the "Sea Shell"—which has recently started work in the Persian Gulf. These 6-cylinder engines, of the C SRK type, are pressure charged, charge cooled, and have a continuous site rating of 795 bhp at 900 rpm. Each has a Fluidrive hydraulic coupling and a splined clutch, and the four are coupled through a compound chain drive. Two of these normally supply power to two English Electric 500 kw generators.

The first truck to be shipped to the US by *Leyland Motors Ltd.* since announcing full-scale plans to market its diesel trucks there has been handed over to Yale Express Systems Inc., of New York City. This is an "Albion Chieftain" and the 7-ton chassis, powered by a 94 hp Albion diesel, is fitted with a 20-ft long van body. Albion Motors Ltd. has recently received an order worth over £280,000 from Shell-Mex and BP for a large fleet of 8-wheeled "Albion Caledonian" tanker chassis. These will be powered by 125 hp Leyland 0.600 diesels and fitted with 4,000-gal aluminum tanks and special easy-entrance cabs.

Seven Petro-Chem Iso-Flow furnaces, valued at over £300,000 are to be supplied by *Birwelco Ltd.*, of Aston, Birmingham, for Esso Petroleum's new Milford Haven refinery. One of these, of the all-radiant type and with a duty of about 55 million Btu/hr, is for the Hydrofiner train. The other six are for the Powerformer unit, with a total duty of over 300 million Btu/hr: these range from 60 to 110 million Btu/hr, the largest one being designed as a radiant separate convection unit to give an efficiency of around 70%.

Three recent agreements with leading termal insulation manufacturers in Buenos Aires give *The Cape Asbestos Co. Ltd.* a firm interest in the market of Argentina. Montisol Argentine SRL is to produce "Caposite" blocks and pipe sections by machinery supplied from England; a new company Bruno-Cape SA, has been formed to make asbestos fiber jointings and general asbestos goods; and under the third agreement an asbestos textile factory is being re-equipped to modernize it and expand production.

New Publications

"Corrosion of Heat-resisting Alloys in the Presence of Fuel-Oil Ash and Corrosion by Vanadium Pentoxide-Sodium Sulphate Mixtures in Laboratory: Correlation with Corrosion by Oil-Ash in Field Tests."

Parts 1 and 2 of the findings of Corrosion I Committee of the Council of British Manufacturers of Petroleum Equipment are now available in one publication. Part 1 gives detailed results of exposing a series of heat-resisting alloys to ash deposition in the superheater zones of oil-fired boilers and shows the only alloy resistant to all deposits is ferritic 26% Chromium, an alloy deficient in strength at elevated temperatures. Austenitic steels of low nickel content were more resistant to deposits of low V:Na ratio and high nickel alloys were more resistant to deposits of high V:Na ratio. Part 2 reports laboratory tests which confirmed this order of merit. Copies from CBMPE, 2 Princes Row, Buckingham Palace Road, London, S.W.1, Price 5s, incl. postage.

"The Petroleum Handbook"—It is regretted that the title of this completely rewritten and considerably enlarged fourth edition of this work, published by Shell International Petroleum Co. and now generally available for the first time, was referred to in the January issue as "The Petroleum Industry" in error.

"IP Standard for Petroleum and its Products"—To alleviate the difficulties caused by the growth in size of the Institute of Petroleum's "Standard Method for Testing Petroleum and its Products" and to provide certain methods in more convenient form, these methods are henceforth to be issued in four separate publications. Two of these are now available. They are Part I: Methods for Analysis and Testing (price 42s., post free), and Part IV: Methods for Sampling (price 10s., post free), from the IP, 61 New Cavendish Street, London, W.I.

In preparation are Part II: Methods for Rating Fuels—Engine Tests, and Part III: Methods for Assessing Performance of Crankcase Lubricating Oils—Engine Tests. These are expected to be available during the year.

P. R. A. Ensor

G. J. R. Tod

Appointments

P. R. A. ENSOR has been appointed chief representative and general manager for Iraq Petroleum Co. in Lebanon, covering all operations in that country and in Jordan and **G. J. R. TOD** succeeds him as chief representative of Qatar Petroleum Co. and general manager of Qatar and its associated companies in southeast Arabia. Mr. Ensor has held this position since 1954 and Mr. Tod was previously assistant general manager at Umm Said.

THE EARL OF INCHCAPE has been appointed a director of Burmah Oil Co. He is chairman of Gray, Dawes & Co., deputy chairman of British India Steam Navigation Co., and a director, among other companies, of Peninsula & Oriental Steam Navigation.

A. R. O. SLATER, FCA, has been appointed a director chairman of Antwerp Oil Wharves Ltd. to succeed **T. W. MELDRUM,** who has resigned as a director. **E. E. JONEZ** has been appointed chairman of Overseas Tankship (U.K.) Ltd. in succession of **E. J. SHEARER** who has retired.

Italy-Romania To Trade

In the next quarter, Italian imports of Romanian oil are to total 15,000 tons (1,000 b/d). ENI is said to have signed a contract for importing 60,000 tons of Romanian fuel oil as part of a new Italian-Romanian trade agreement.

Soviet Oil To Italy Increases

Shipments of crude and fuel oil to Italy in 1960 under the terms of a new trade agreement will exceed 1959 shipments by 25%. Shipments will consist of 43,900 b/d of crude and 12,300 b/d of fuel oil.

Shell Nederland N V

Shell Nederland N V has been formed as an autonomous organization of the Royal Dutch/Shell group to manage the existing Netherlands operating units. This step is a result of the group's decision to organize its operations separately because of their steadily increasing importance and complexity.

Japanese Sign With French

Cie. Francaise des Petroles (in France) has signed an agreement with the Japanese company New Asia Oil Co. to lend the latter $5 million for 10 years at 6% interest. New Asia Oil will build a 30,000 b/d refinery in Yokohoma to cost 7,500 million Japanese yen. The Japanese company agrees to purchase its crude for 10 years from the French company, and the latter will make the required deliveries by withdrawals from its share of Iraqi production.

Venezuela Visitor

Senor Maximo Ezeiza, (third from left), safety inspector of Gulf Oil Corp's Venezuelan subsidiary, Mene Grande Oil Co., watches a mechanical man demonstrate "How To" lift heavy packages. Senor Ezeiza is on a four-month visit to the United States, as a guest of Gulf, to study industrial safety. Performing demonstration is R. H. Leith, (second from left), safety engineer, Gulf's New York sales division. Watching are A. H. Crowell, (left), manager employee and dealer relations, and George R. Burt, (right), supervisor, accident prevention, both of Gulf's New York sales division.

Arbitration Asked In Morocco

The Moroccan company, Petroles de Maroc (SPM), has protested the annulment of permit applications in Morocco and proposes to carry its case to the World Court at The Hague if the Council of State at Morocco does not make a favorable decision.

Canso Awarded Helium Permit

United Canso Oil & Gas Ltd., largest gas producer in Saskatchewan, has been awarded a 3½ year helium permit for exploration on 88,160 acres in the Vidora-Consul area of southwest Saskatchewan. The United States presently is the world's leading producer of helium, used in defense projects utilizing high temperature alloys.

No Soviet Price Cutting

According to the director of the All-Union Oil Export Board, the USSR has no intention of cutting world oil market prices. For at least the duration of the present Seven-Year Plan, crude production is expected to exceed domestic consumption.

To Win Austrian Oil Market

Polish sources believe Moscow will ask Austria to have its new Schwechat refinery connected to the Slovak branch of the multi-country Soviet-Eastern Europe oil pipeline in order to win Austria as an oil market. Austria's oil needs are growing while her reserves are declining.

India Cancels Private Pact

Oil Minister Malaviya has announced the government of India has cancelled the recent agreement between a private Indian company (Hindustan Organizers Private Ltd.) and the Soviet Foreign Trade Agency for the importation of Russian oil products. New Delhi official circles expressed dismay at the signing of such a pact while negotiations were proceeding between India and the USSR for a government-to-government import arrangement. Misinterpretation of the 1960 Indo-Russian trade agreement was cited by Malaviya, who says the misunderstanding has been cleared up between the two countries.

More Drilling In Papua

Australasian Pertoleum Co. Pty. Ltd., in which BP Exploration Co. is a major partner, is preparing to drill a new test well in Papua. The well site is located some 15 miles northwest of Barikewa, and will be known as Iehi No. 1.

BP Libyan Surveys

A marine seismic survey is due to start in two Libyan offshore consessions held by British Petroleum Co.

The Valve Complex on the Shell-B.P. Petroleum Development Company of Nigeria Limited's discovery well at Oloibiri, Nigeria.

The positive tightness of *Newman-McEvoy* VALVES

Automatic sealing, self-aligning gates and non-distorting seats combine to give unquestionable 100 per cent tightness at all times and in all circumstances. An independent sealing system operated by line pressure on each side of the valve stops leakage as it starts. Stem packings and bearings are easily replaced under full line pressure. Proved under hardest working conditions.

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"A few answers to questions about

HIGH GASOLINE TAXES

all oilmen should know!"

Q. What is the average federal and state tax on ten gallons of gasoline?

A. About *one dollar!*

Q. At what rate, then, is gasoline taxed?

A. At about 50% of the price, or nearly five times the tax rate on such luxuries as furs and diamonds.

Q. How much have gasoline taxes increased in the last ten years?

A. About *51%*.

Q. What about gasoline prices in this same period?

A. They have increased only 5%, as compared with 22% for prices in general.

Gasoline's a buy... only the tax is high!

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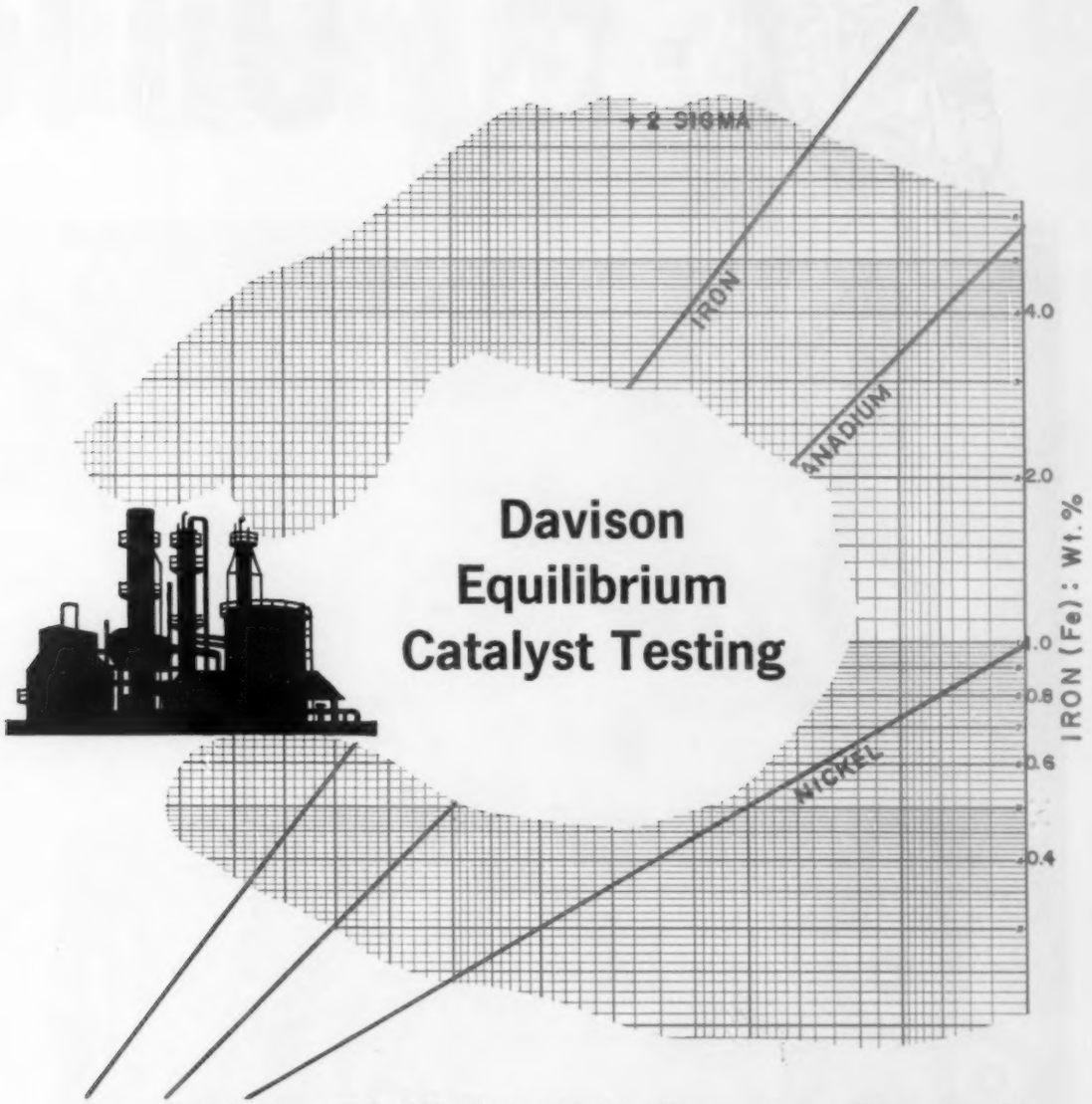

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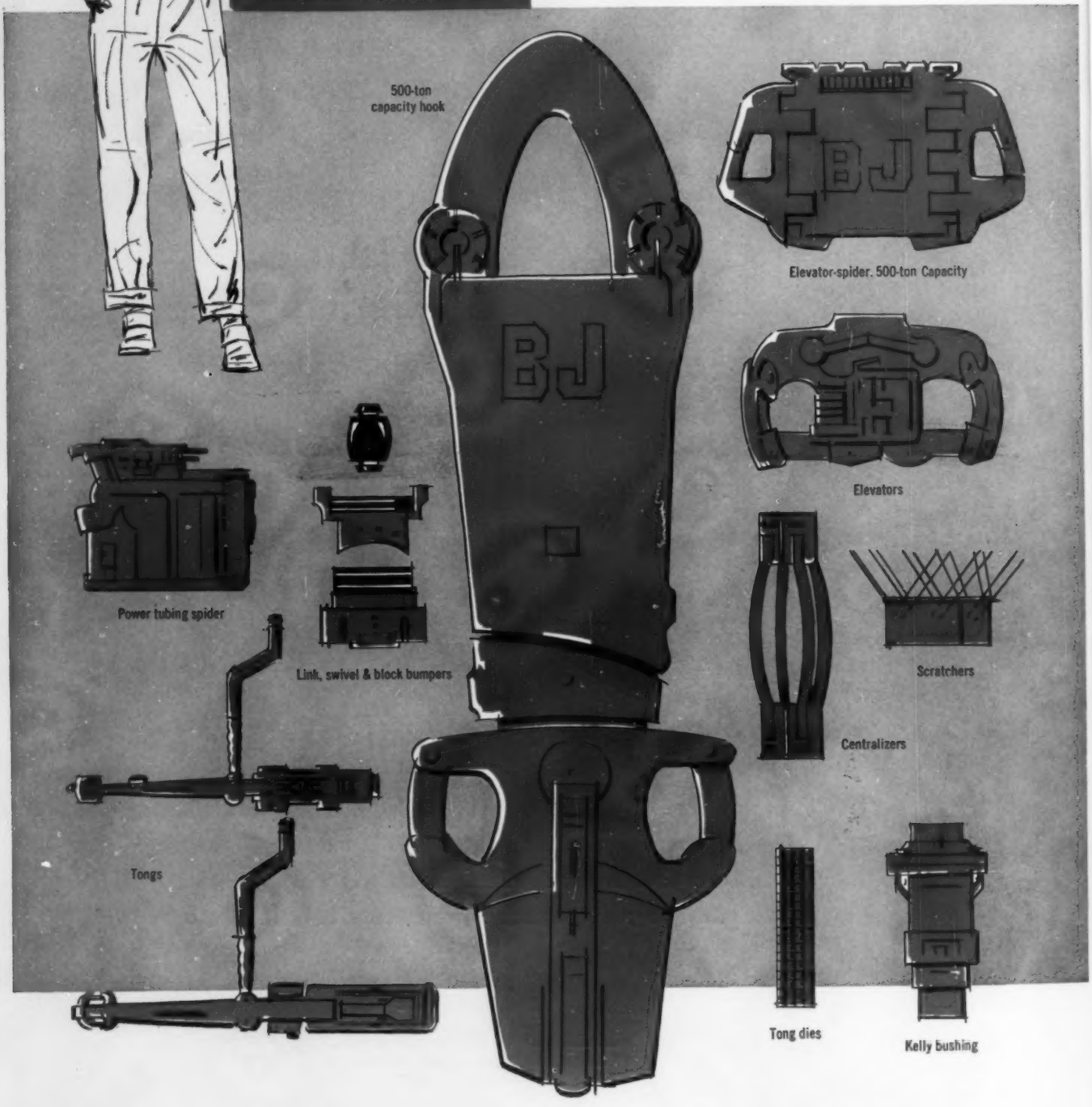
BJ Oil Tool



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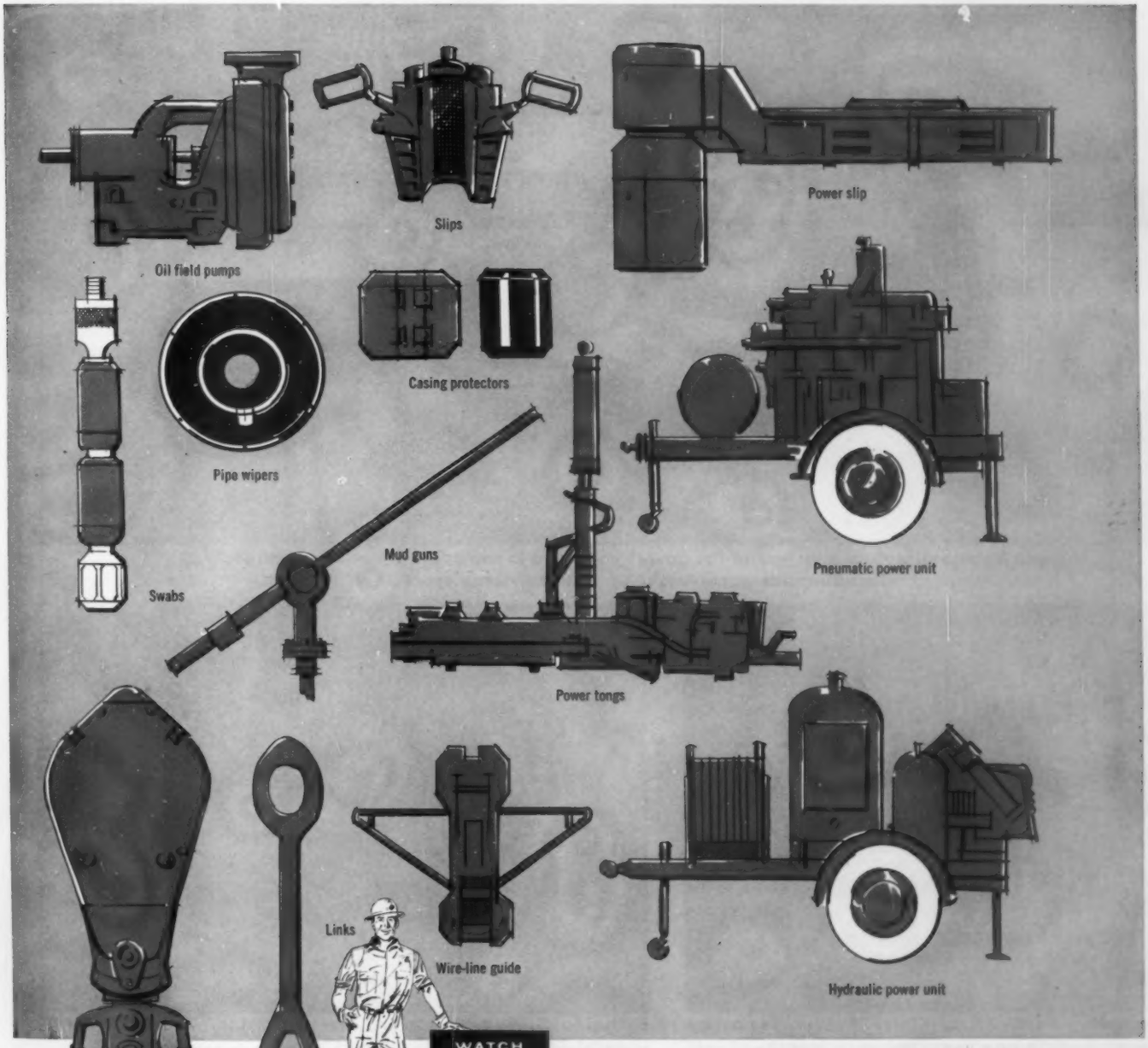

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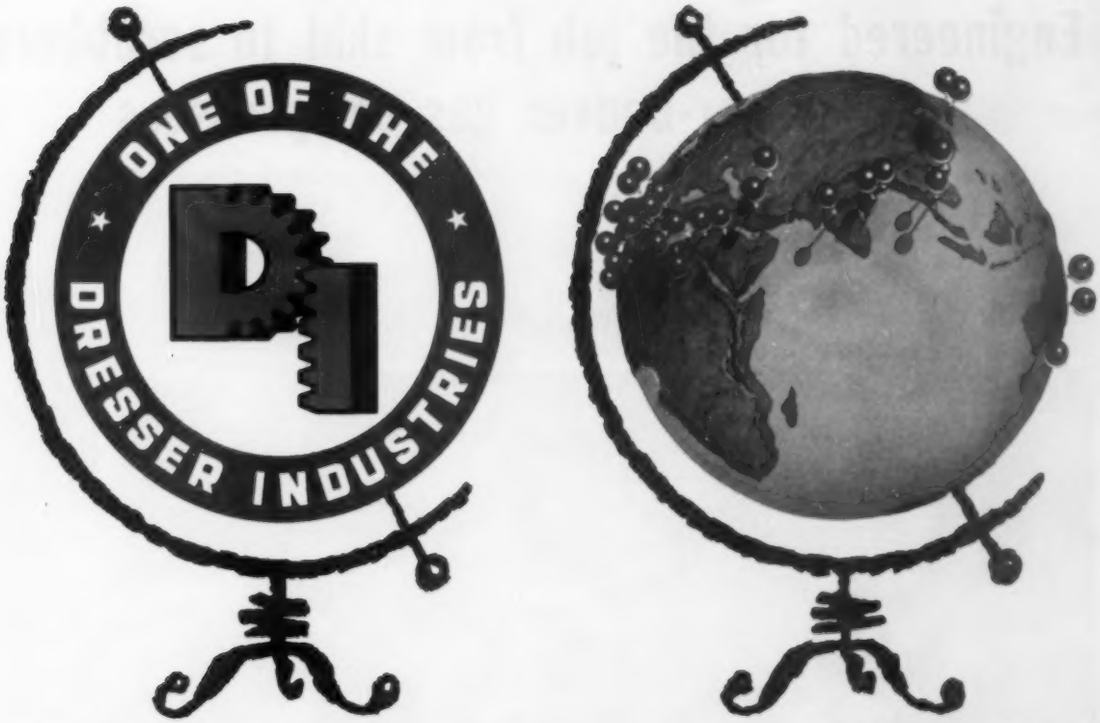

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THE GUIBERSON CORPORATION—oil tools, molded rubber products

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PACIFIC PUMPS, INC.—centrifugal pumps & oil-well plunger pumps

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SOUTHWESTERN INDUSTRIAL ELECTRONICS—electronic instrumentation, computer systems

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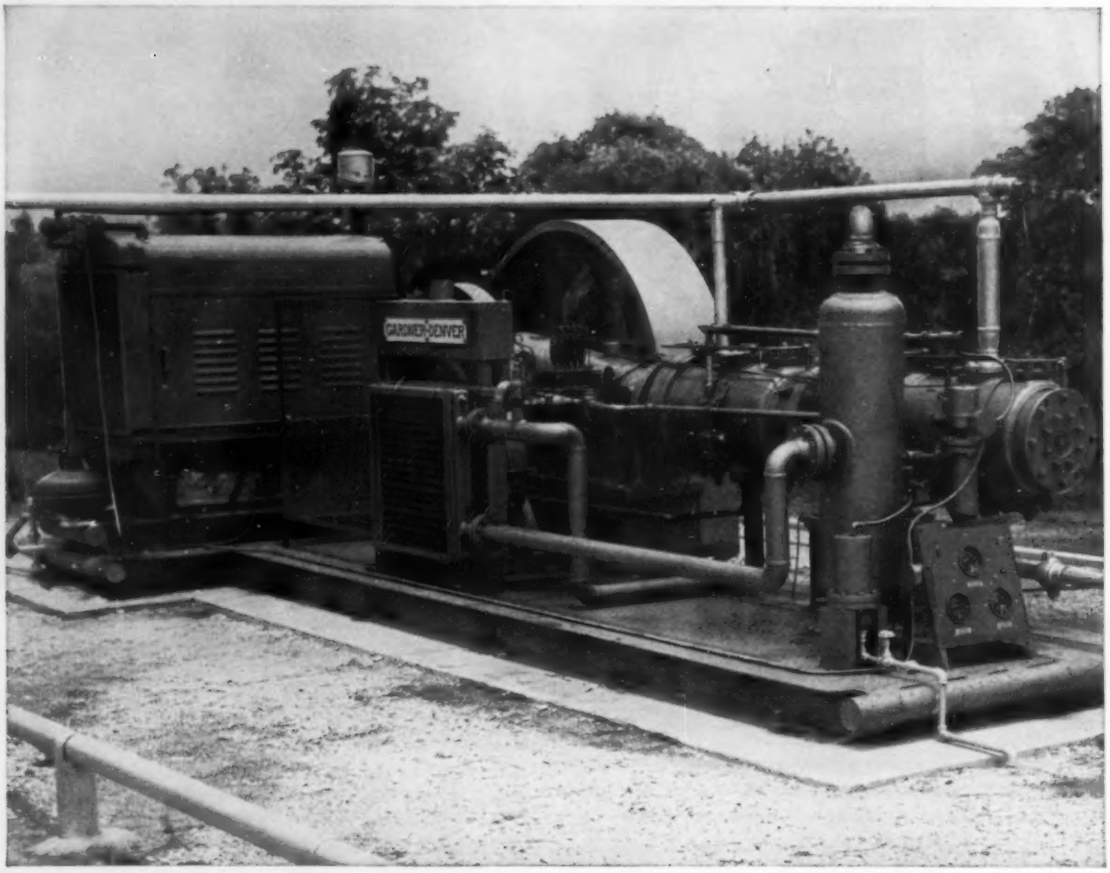

Model RX horizontal gas compressor. Tandem-cylinder arrangement permits operation at widely varying pressure conditions.

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Gardner-Denver gas compressors are tailored to meet specific field conditions. All components are Gardner-Denver-engineered . . . are combined at our Dallas plant into a compact package ready for service. Ask your Gardner-Denver petroleum industry specialist for details.

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shell

blazes a Muskeg trail

One of the big problems in the development of oil and gas deposits in the Canadian Northwest is muskeg. Once the frost comes out of the ground, this impenetrable swamp completely bogs down men and machines alike until the next freeze up.

One experimental approach to overcoming this costly limitation imposed by nature is Shell's Nodwell transporter which has already made several successful trips over muskeg loaded with heavy drilling equipment.

This example of the oilman's continual search for efficiency and increased productivity helps to explain why petroleum continues to meet the exacting, growing and constantly changing demands of our age for its products.

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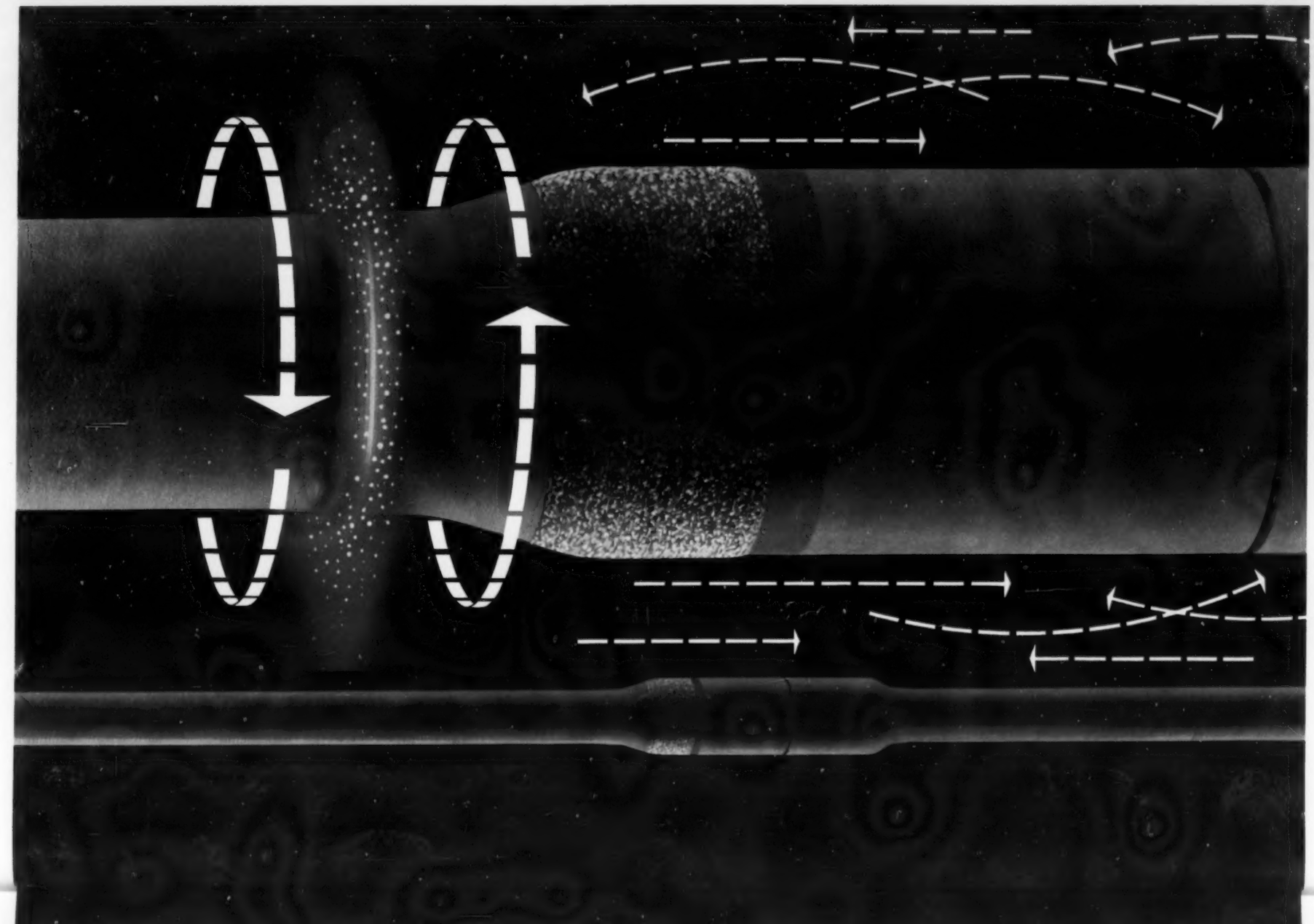

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ANOTHER EXAMPLE OF REED LEADERSHIP IN TOOL JOINT DESIGN

For twenty-five years Reed has pioneered advancements in tool joint design—the Shrink-Grip joint which practically eliminated last engaged thread failures—the Internal Flush joint that became API Standard—the Double Streamline joint (the 4½" size later adapted as API Standard 4" Full Hole)—the Semi-Internal Flush joint (later called Extra Hole)—the Super Shrink-Grip joint with cylindrical land and fixed landing shoulder for foolproof field application and removal—the Wide-Open joint for light weight drill pipe—the "tensile impact" test for flash welds.

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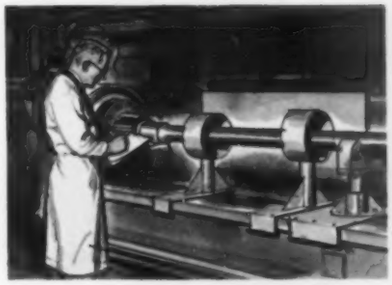

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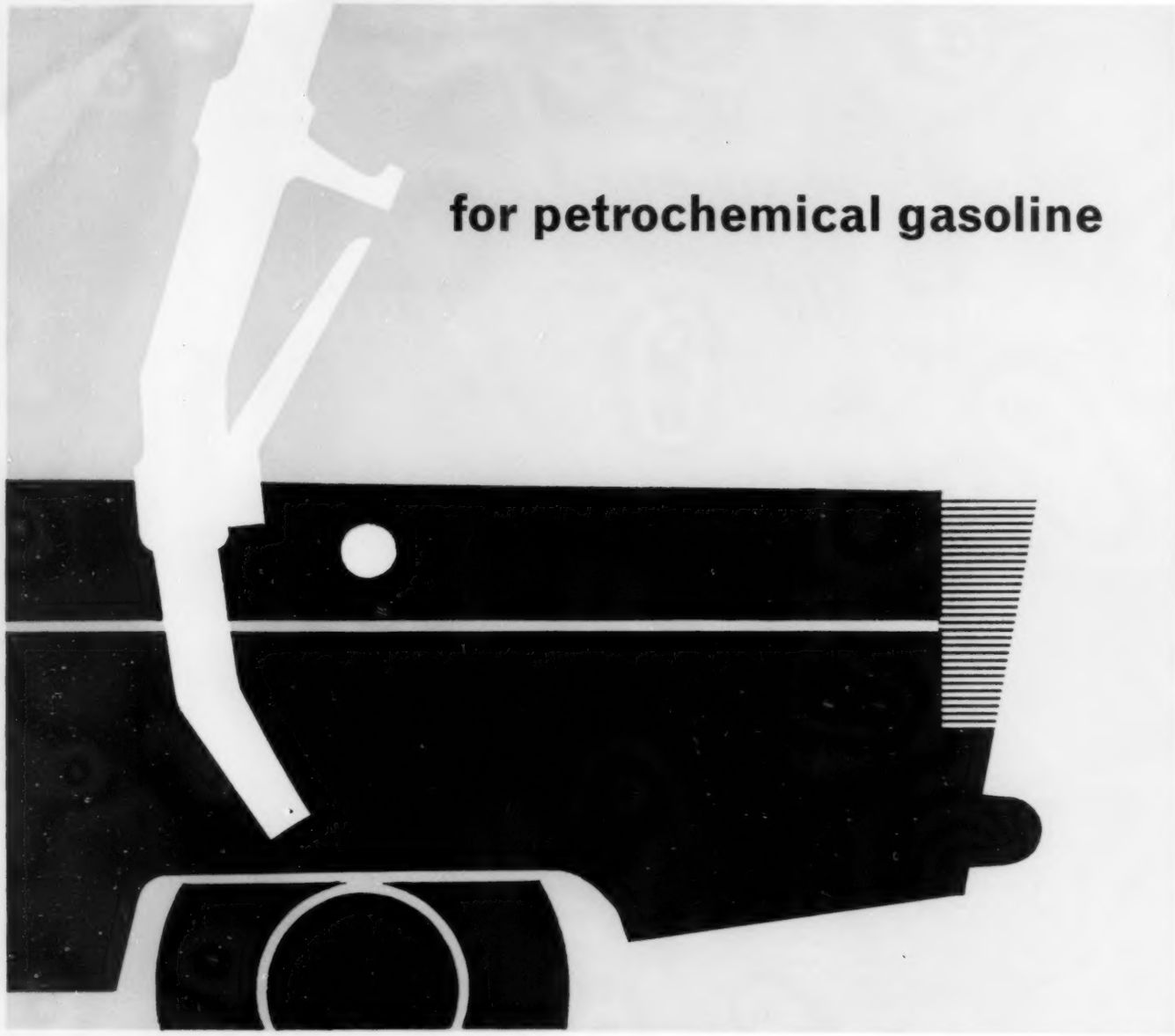

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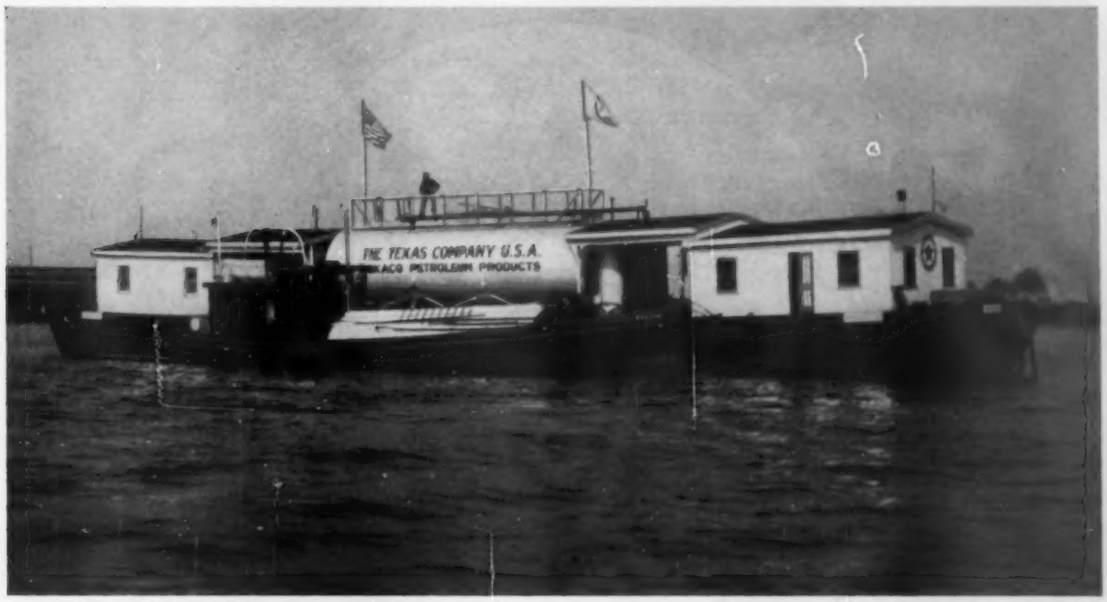
NEWS ON TEXACO PROGRESS

From coastal to global operations



YESTERDAY—Shortly after its founding in 1902, Texaco had only one, small, wooden barge—transporting crude oil slowly along the Gulf Coast and up the Mississippi. Its capacity was 170,000 gallons.

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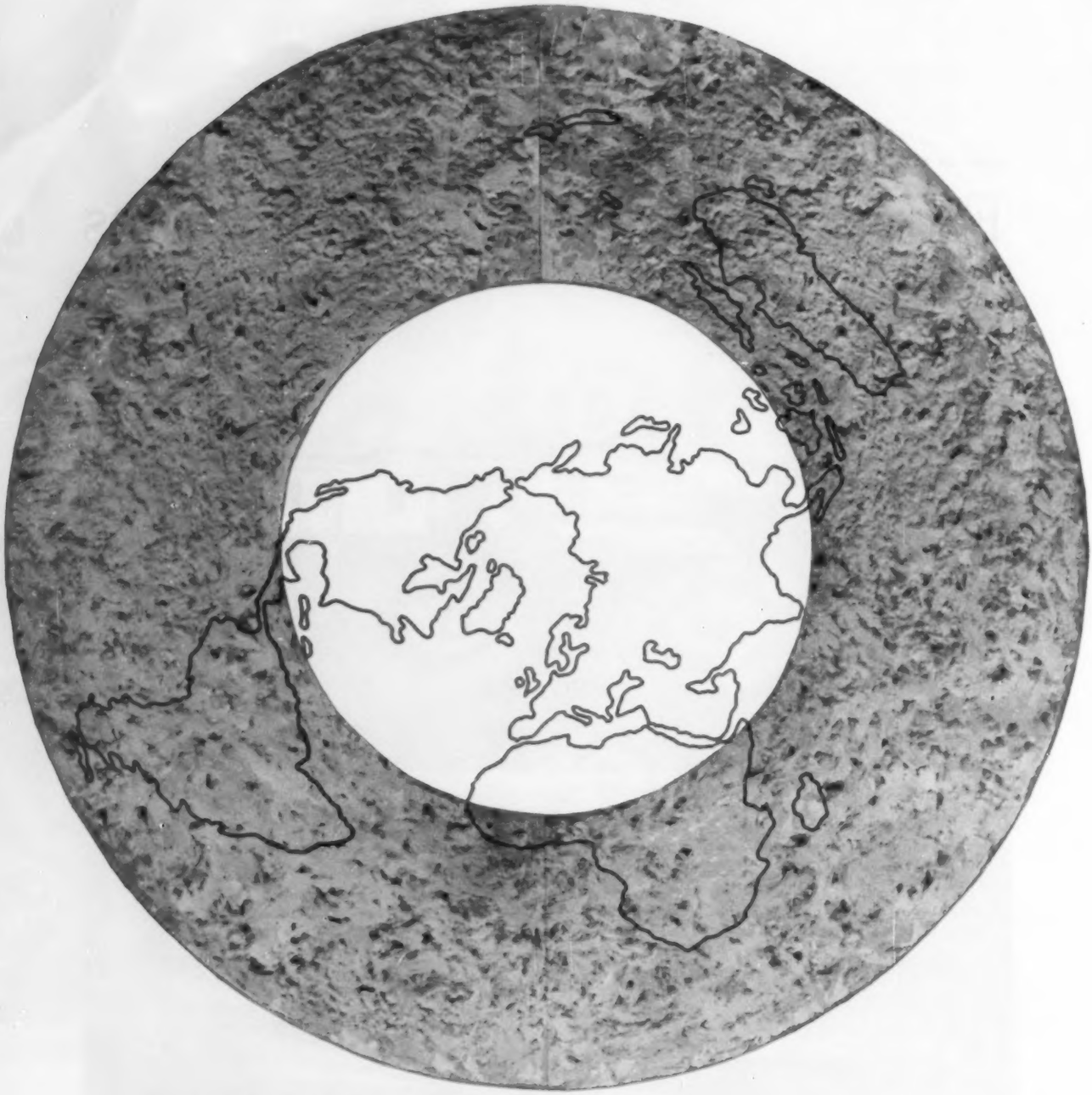

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—and to the same specification

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Canada	by Caposite Insulations Ltd
South Africa	by Cape Asbestos Insulations (Pty) Ltd
Australia	by James Hardie & Company Ltd
France (as 'Isolamiante')	by Isolamiante SA
Italy	by Capamianto SpA
Holland	by J. de Boer & Company
Spain	by Messrs. Eduardo Rosa
Argentina	by Bruno-Cape SA
Japan	by Nippon Asbestos Company

Amosite asbestos insulation is also manufactured in U.S.A. under the name of 'Unibestos' by Union Asbestos and Rubber Company.

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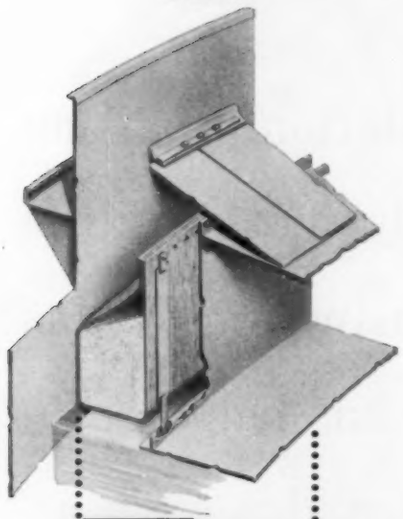
TA3612

FIRST solid cushion seal



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Smith Threaded Flow Nozzle sectioned to illustrate O-Ring and general construction

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and NOW...
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dual-function
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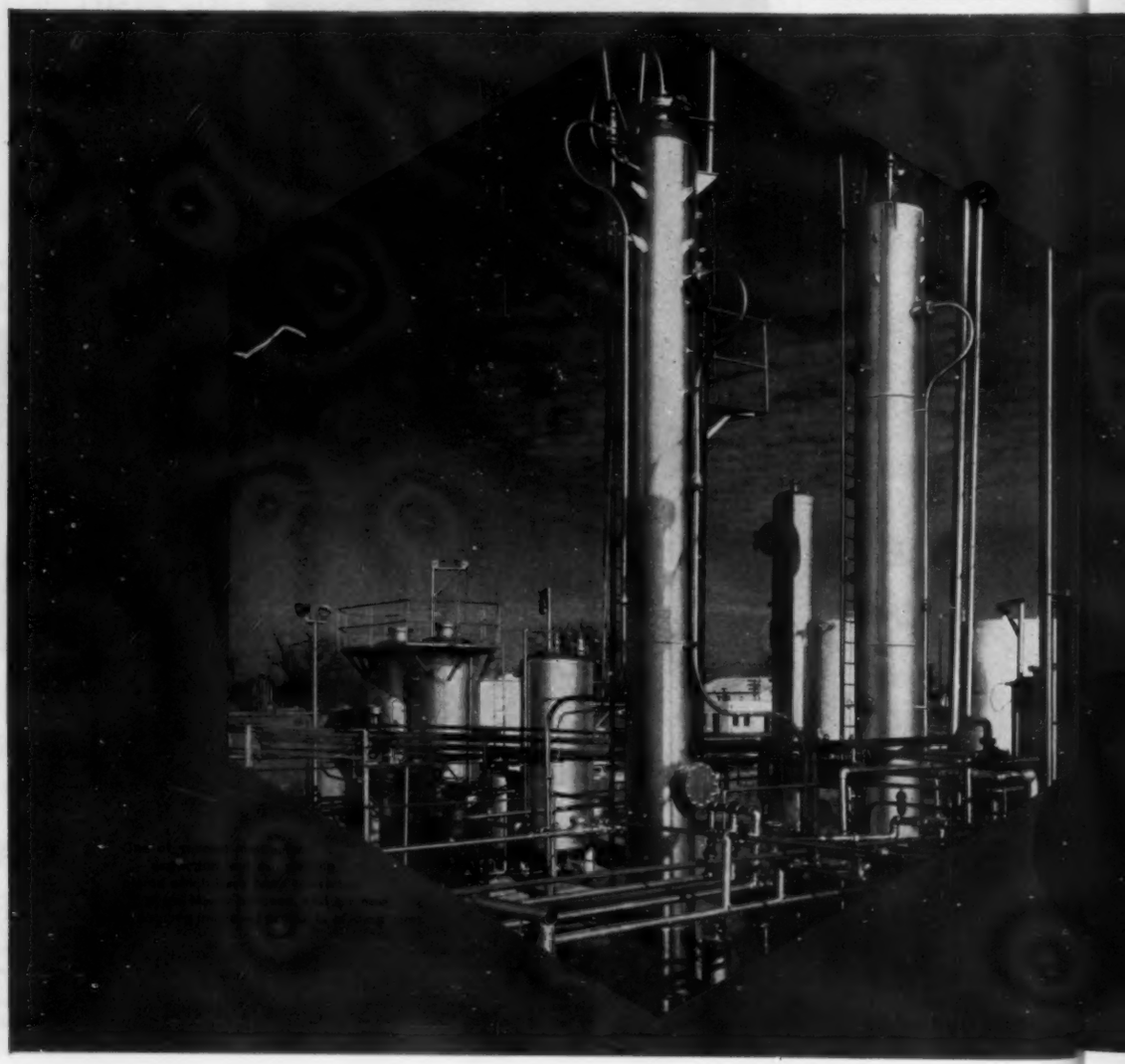

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"ATLASITE" Insulation

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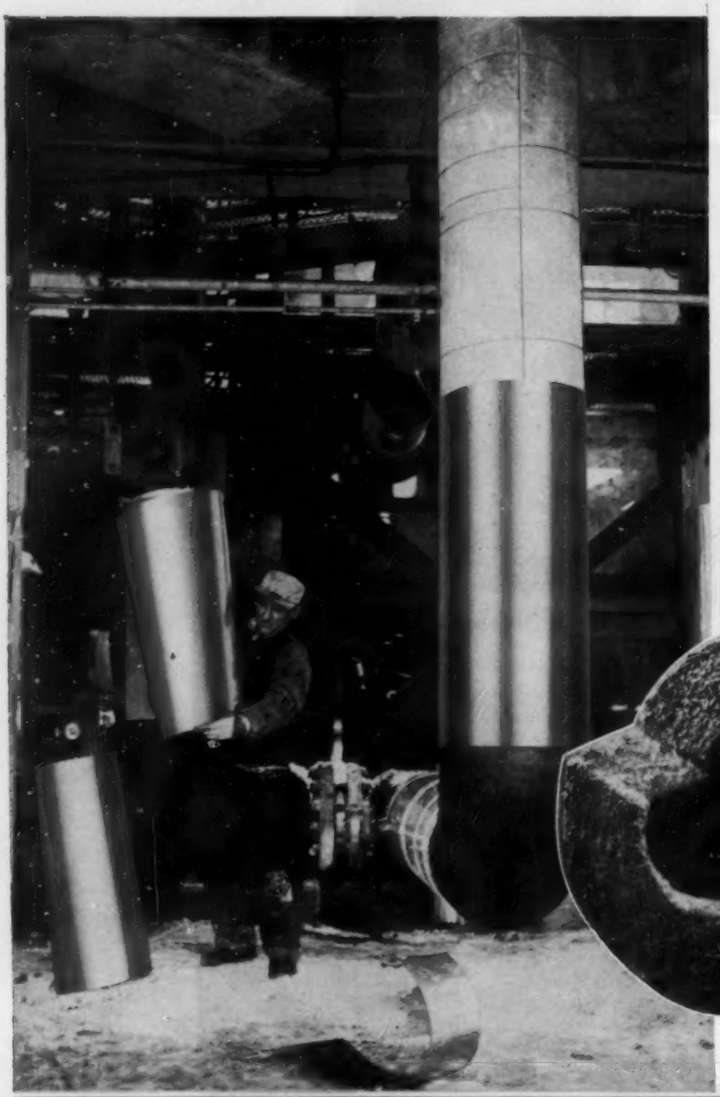
B P REFINERY CANADA LIMITED, MONTREAL, P.Q.



"ATLASITE"— manufactured of Amosite Asbestos Fibres — is the standard of rigid insulations. Its efficiency, strength and ease of handling make "ATLASITE" the ideal insulation for rugged conditions and temperatures to 1000° F.

Approved Applicators and Distributors located from coast-to-coast.

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Lower a McCullough Chemical Tubing Cutter to the desired depth. Push a button. Before you can snap your fingers, your tubing is cut.

This electric wire line tool applies the enormous power of halogen fluorides to cut tubing as easily as a knife cuts through hot butter — and it's a smooth, flare-free cut — no burrs nor distortions on either the OD or ID of the tubing.

Cutting action is closely controlled. The outside casing

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Compared to mechanical methods, you will make significant savings in valuable rigtime when you use the McCullough Chemical Tubing Cutter. Available for 2" and 2½" tubing at all McCullough Service locations.

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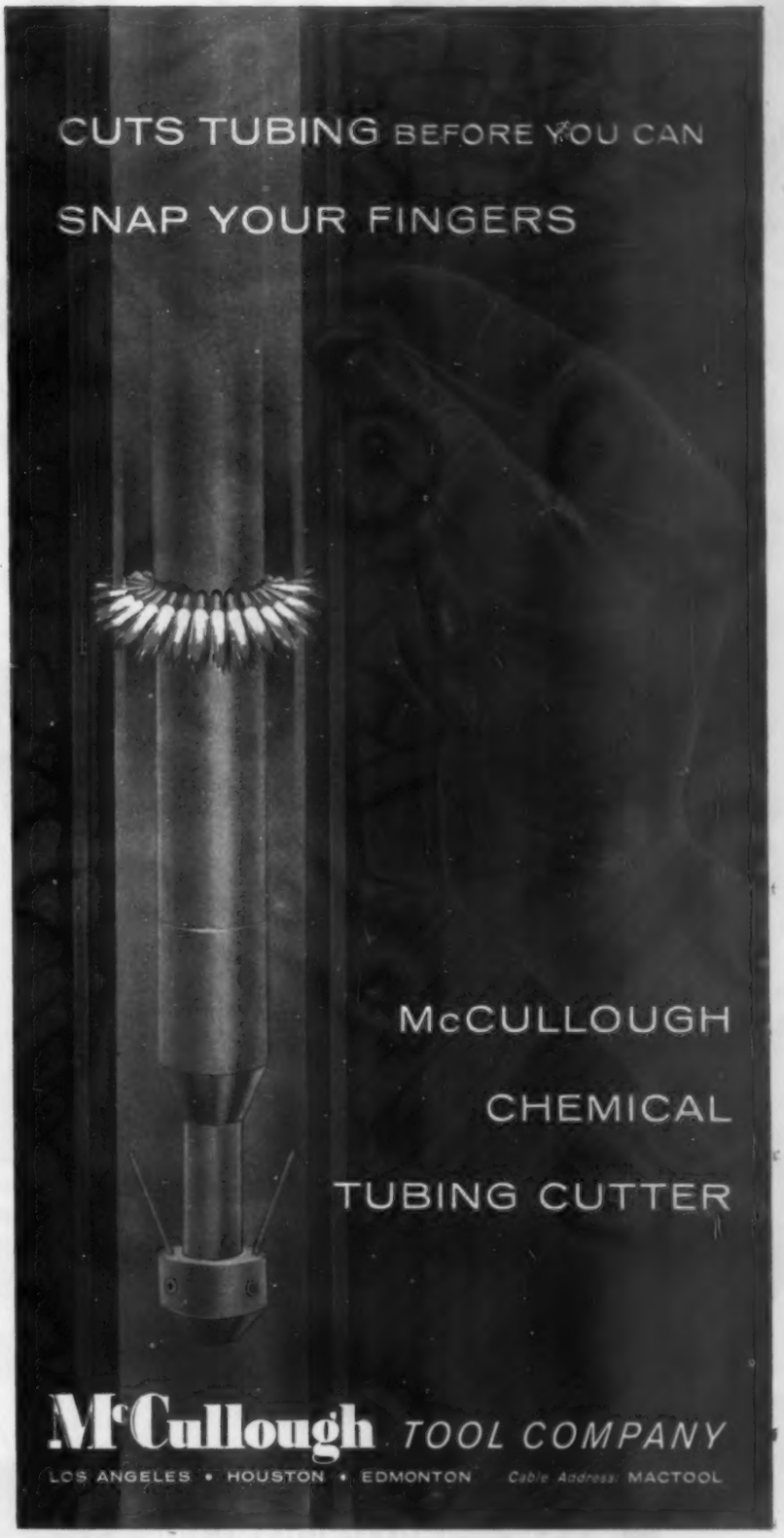

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CALTEX

Caltex . . . serving the petroleum needs of 77 Countries in Europe, Africa, Asia and Australasia

Cat Cracker FOR CANADA

CB&I's Chicago plant fabricated the components for this UOP catalytic cracking unit installed at a Canadian refinery. Included were the reactor-regenerator, stripper, catalyst hoppers and riser pipe. Erection at Regina, Saskatchewan, was handled by Horton Steel Works Limited, Toronto, Ontario, a subsidiary of CB&I.

This cat cracker is an example of *CB&I Craftsmanship in Steel*, demonstrating the ability of CB&I to coordinate engineering, fabrication and erection facilities to provide structures which meet the most exacting specifications.

It will pay you to learn how CB&I's *coordinated services* can give you better performance and longer effective service life for tanks, towers, vessels and special processing equipment. These *coordinated services* are available to you on a worldwide basis. For further information, write our nearest office.

Cat cracker fabricated by CB&I and erected by Horton Steel Works Limited, Canadian subsidiary.

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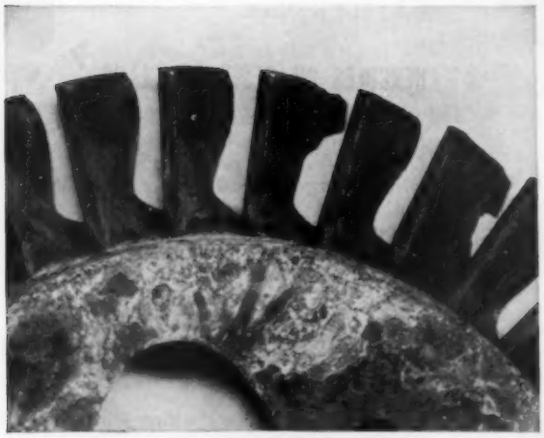
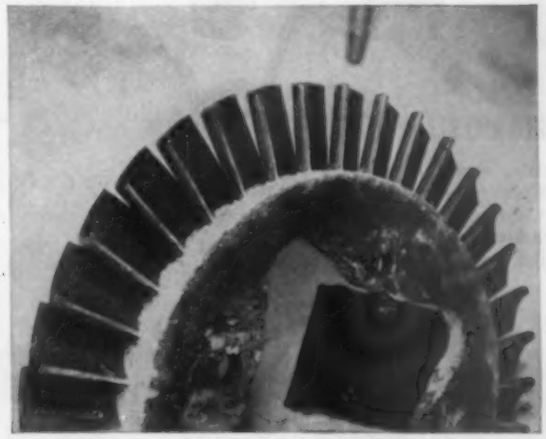
P85CB

NEW SHELL POWER RECOVERY PROCESS CUTS CRACKING COSTS

Shell now offers a way to run power recovery turbines on waste energy. The key to this process is a simple, effective fines separator that protects gas turbine blades to obtain long turbine life. Look at these unretouched photographs.



WITHOUT SHELL PROCESS—Turbine nozzle blades after only 650 hours of operation.



WITH SHELL PROCESS—After 4000 hours of operation.

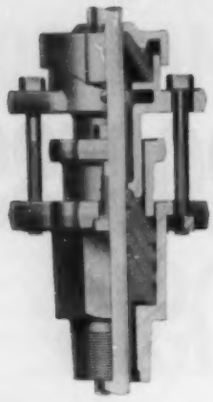
The use of this Shell-designed fines separator with existing fluid-bed cat cracker regenerators permits the inexpensive expansion of carbon-burning capacity. In new systems it is capable of making substantial savings on your steam or power requirements. The process is licensed by Shell and through authorized contractors. Inquiries are invited. Shell Development Company, 50 West 50 Street, New York 20, New York.

SHELL DEVELOPMENT COMPANY

HERCULES CONE PACKED STUFFING BOXES

Provide the ultimate in SAFETY, ECONOMY and EASE of operation

Hercules Stuffing Boxes — like all Hercules Products — are improved constantly to meet the changing needs of the industry and are available in three styles. They are used internationally and are available through supply houses, everywhere.

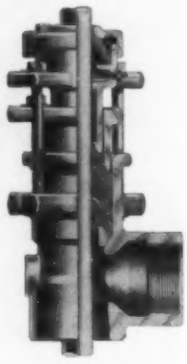


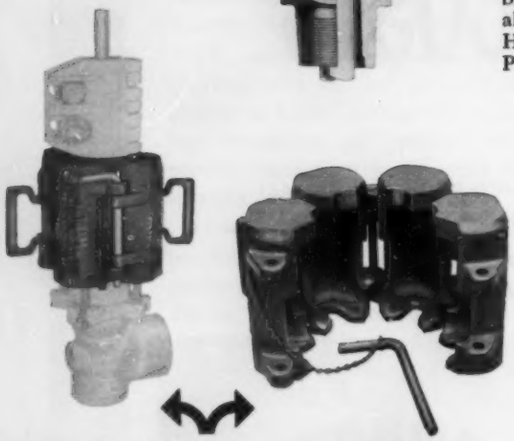
HERCULES REGULAR TYPE DUPLEX STUFFING BOX

More efficient operation with fine adjustment possible. Offers longer packing life due to ability of Packing and Glands to follow lateral movement of Polished Rod. Malleable iron construction prevents breakage if rods are accidentally dropped on Stuffing Box. Has male thread to screw into Pumping Tee.

HERCULES TEE TYPE DUPLEX STUFFING BOX

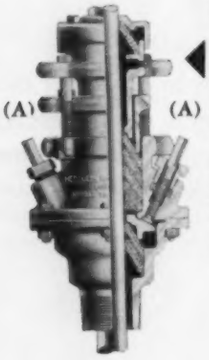
A combination Tee and Stuffing Box only 15" high. Eliminates one threaded connection between Stuffing Box and Tee. Full opening — allows rods to be run or pulled without removing Stuffing Box body. Has female thread to screw directly onto tubing.





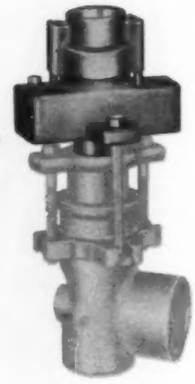
HERCULES POLISHED ROD CLAMP-OFF SUPPORT

Used with Hercules Regular and Tee Type Stuffing Boxes to *prevent accidents* or personal injuries while clamping off. Manufactured from high tensile aluminum alloy, will safely support 30,000 lbs. weight.



HERCULES TYPE DP (Double Packed)

Duplex Stuffing Box for use on high pressure or intermittently flowing wells. Allows Main (upper) Packing to be safely and easily replaced while well is under pressure. The two compression bolts (A) are turned clockwise until the lower Packing seals off. The Main Packing can then be removed and replaced.



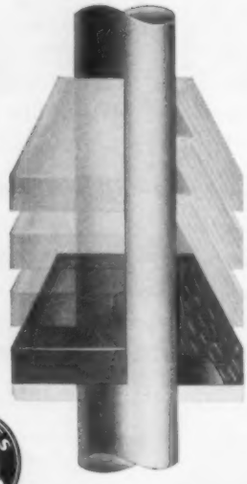
HERCULES OIL RESERVOIR GLAND

All Hercules Stuffing Boxes may be equipped with *Oil Reservoir Upper Gland* on *problem* wells which pump off and burn packing. The polished rod runs through the Reservoir, and is cooled and lubricated by its fluid.

For Best Results in Hercules Stuffing Boxes, use only

HERCULES CONE-SHAPED PACKING RINGS

Each set of Hercules Cone-Shaped Packing Rings now include the NEW, SOLID Split Bottom Cone Packing Ring. This new solid ring provides greater contact with the polished rod and a more substantial base for the upper Packing Rings, resulting in *longer* packing life and superior performance. A complete set now consists of three *regular* and one new split *Bottom Cone* Ring.



THERE'S A TYPE SPLIT CONE PACKING RING FOR EVERY REQUIREMENT:

Hercules Split Cone Packing Rings come in four grades: SOFT, HARD, SPECIAL LUBRICATED and HEAVY DUTY. SOFT Rings are always used with bronze liners or with steel polished rods in wells which are not always pumping fluid. HARD Rings are recommended for steel polished rods only, and where fluid is constantly being pumped. SPECIAL LUBRICATED Rings are recommended for problem wells which pump off persistently. When well is pumped dry, the rings lubricate the polished rod and prevent the packing from burning until fluid is again present. HEAVY DUTY Rings are recommended for problem wells. Properly adjusted, they give phenomenal life.

ACCEPT NO SUBSTITUTES

Ask for and accept only Hercules Cone-Shaped Packing Rings for use in all HERCULES Duplex Stuffing Boxes. All HERCULES Products are available through Your Supply Store.

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SGL.44

by William C. Uhl
Processing Editor

Highlights of the month—reports on how to increase processing profits, improvements in cracking catalysts, and two new hydrocracking techniques

More dollars per barrel was a phrase in the title of one of the technical papers at the recent annual meeting of the Western Petroleum Refiners' Association in San Antonio, Texas. And, it was the major theme of several of the papers for the simple reason that it is a basic and major target of refiners today.

More dollars per barrel in the USA means more motor fuel. The avenues of approach a refiner can take are several. Among those presented to the more than 1,100 processing men at the meeting were these:

1. Two new cracking catalysts: one aimed at giving higher gasoline yields at equivalent quality, and the other aimed at higher propylene and butylene yield at the expense of coke and light gases.

2. Two new catalytic hydrocracking processes; one to convert more middle distillates ranging from kerosine to heavy vacuum gas oils into lower boiling products; and the other to convert marginal or problem cracking stocks into high quality gasolines and middle distillates. Both new processes offer refiners two more techniques similar in approach to a process announced late last fall ("Isocracking — Cal Research's New Process" WORLD PETROLEUM, pp. 70-76, December, 1959).

The new catalysts aimed at a more useful product distribution from catalytic cracking units are made of silica, alumina and magnesia. They were discussed by Robert M. DeBaun, American Cyanamid Co., who presented results of pilot studies on two specific types; one a 20% alumina-3% magnesia and the other a 12% alumina-3% magnesia catalyst.

The pilot studies were carried out on a fixed fluidized bed cycling unit (2-inch column), using a 10-minute reaction cycle, 5-minute steam purge, and 30-minute regeneration cycle. Principal feed was a Mid-continent gas oil—31.9 API, 0.39 wt-% sulfur, 265 F Pensky Martin flash point, 0.035 Conradson carbon, 521 F initial, 647 F 50%, and 760+F 95% point. Both catalysts demonstrated significant increases in yield of catalytic naphtha, butylene and propylene, and decreases in carbon and isobutane at conversions ranging from 40 to 60 vol-%.

A comparison of inspections on gasolines obtained using the 20% alumina catalyst versus conventional catalysts was reported as follows:

	20 Al. 3 Mag.	13 Al.	25 Mag.	Nat. MS*
CFRR (clear)	96.3	94.8	91.5	94.3
CFRR (3 cc. TEL)	100.3	99.7	98.3	99.5
Aniline pt. °C	72	72	87	68
Bromine number	74	59	77	75
API gravity	60.3	58.8	—	—

*Microspheroidal, semi-synthetic derived from natural materials.

The gasoline, C_5—400 E.P., was obtained from the pilot unit at 50 wt-% conversion, 940 F reactor temperature.

Mr. DeBaun presented figures on the economics of using the new catalysts, based on average 1959 Gulf Coast prices and for four hypothetical cases. In a refinery making polymer gasoline but using no alkylation, the incremental product realization using the catalysts ranges from 4.4 to 5.8 ¢/bbl of gas oil. In a refinery which has alkylation but no poly unit, incremental product realization ranges from 1.3 to 3.7 ¢/bbl of gas oil. The refiner using both an alkylation and a poly unit can obtain an incremental realization ranging from 4.1 to 5.5 ¢/bbl. And in a less common operation—using a poly unit and no alkylation but producing chemical propylene—the incremental realization was estimated to go as high as 9.9 ¢/bbl of gas oil.

He pointed out that the calculations are based primarily on value of final product and avoided considerations of profitability, such as the possible payout of units which might be installed to take advantage of these changes in product distribution.

The studies are by no means finished. Further pilot work is being done on a California and a West Texas gas oil; and a commercial trial of the 20% alumina-3% magnesia catalyst is scheduled for this year at a Shell Oil refinery.

One of the new hydrogen processes, trade-named "Lomax," was discussed by M. J. Sterba and C. H. Watkins of Universal Oil Products Co. It uses a fixed bed of solid catalyst in the presence of hydrogen under pressure and produces low olefin content products. The light naphtha, comprising butanes, pentanes and hexanes, is composed predominantly of branched isomers. Aromatics in the charge stock can be either saturated or substantially retained, depending upon specific requirements. In the case of middle distillate production, controlled saturation of aromatics is desirable. On the other hand, when naphtha production is maximized, operating conditions are selected so as to retain a large part of the aromatics.

Lomax permits conversion of light distillates to gasoline, UOP said, and heavier vacuum distillates can be converted into a variety of high quality middle distillate fuels and/or gasoline. The middle distillates will need no further refining. The heavy naphtha should be catalytically reformed, although this step may not be required if regular grade gasoline is to be manufactured. The process produces no catalyst deposit, a smaller amount of light gases than does catalytic cracking, and olefin-free decomposition products. It permits complete recycling of material boiling above gasoline with no sacrifice in yield or quality.

A large variety of charge stocks can be used, including kerosines, stove oils, diesel fuels, other middle-of-the-barrel distillates, catalytic cycle oils, vacuum gas oils, coker distillates, and other distillates derived from catalytic or thermal operations.

The authors compared the results attainable using Lomax in different ways in a refinery scheme. The basic plant processes 50,000 b/d crude, producing 46.6 vol-% total gasoline, 33.8 vol-% middle distillate, and 14.5% heavy fuel oil. Process units include 2-stage distillation, 16,400 b/d Fluidcat cracking at 60% conversion, 13,600 b/d Platforming-Unifining, polymerization and alkylation.

If Lomax is used on the excess FCC light cycle oil and additional Platforming is installed for the 180-400 F Lomax naphtha, product yields shift to the following percentages: gasoline 54.7, distillate, 26.6, and heavy fuel oil, 14.5. Payout on the investment is 2.5 years, before tax.

If Lomax is applied to 9,800 of the available 13,300 b/d of 400-650 F virgin distillate (the amount possible based on available hydrogen from the Platformer), and additional Platforming used for Lomax naphtha, the product yields become: gasoline 67%, distillate 14.2%, heavy fuel oil 14.5%. Payout is 1.5 years, before tax.

If a second cat cracker is used instead of Lomax, and applied to the entire 13,300 b/d virgin distillate with conversion at 73.7 vol-%, additional gas concentration, alkylation and polymerization is needed. Distillate and fuel oil yields remain the same, gasoline yield drops to 63.5, gasoline octane goes up slightly, and middle distillate quality drops somewhat. Payout on the investment becomes six years, before taxes.

Lomax can also be applied if desired on the 16,400 b/d of vacuum gas oil to maximize middle distillate yield. In this case, total yield percentages become: gasoline 38.6, distillate 44.6, heavy fuel oil 13.8.

An example of Lomax operating costs, excluding royalties, was given for the 9,800 b/d unit processing the virgin distillate. Total is 31¢ per bbl, including 19¢ for utilities, 6.5¢ for maintenance, taxes and insurance, 3.5¢ for catalyst and chemicals.

The other new process reported at the WPRA meeting is "Unicracking," and was described by F. C. Wood of Union Oil Co. of California. It is a hydrocracking process, the heart of which is a new catalyst making possible reactions which occur only to a limited extent in straight hydrogenation of conventional cat cracking. These include desulfurization, denitrogenation, and olefin saturation.

A typical unit includes a two-stage reactor system, fractionator, depropanizer, and debutanizer. Reactor temperatures vary from 600 to 800 F, and pressures from 500 to 2,000 psig.

The process was developed primarily for the efficient conversion of refractory (aromatic) stocks and high-sulfur, high-nitrogen stocks to quality gasoline and middle distillates. Optimum feed boiling range is usually about 400-600 F, but this depends on specific refinery situations.

Union Oil's engineers said favorable economics are indicated for the following applications: (1) High gas oil conversion (90-100%) to gasoline, (2) intermediate gas oil conversion (50-80%) to gasoline with unconverted gas oil upgraded to high cetane number diesel fuel, and (3) conversion of heavy cracked naphtha for volatility and octane improvement. The chemistry of the process also suggests the following possible applications: (1) jet fuel production by reduction of boiling range and quality improvement, (2) conversion of highly paraffinic naphthas to high octane light isoparaffins.

Union, in cooperation with C. F. Braun Co., worked out a design and cost estimate for a Unicracker and developed cost estimates for two specific units. Total direct operating costs range from 23.9¢ per bbl for a 15,000 b/d unit at 70% conversion to 32.4¢ per bbl for a 5,000 b/d unit at 90% conversion. Capital investment required for these units would be $7.2 million for the 15,000 b/d plant and $3.8 million for the 5,000 b/d plant, including first catalyst charge. Catalyst replacement cost was estimated at 5 to 6¢ per bbl.

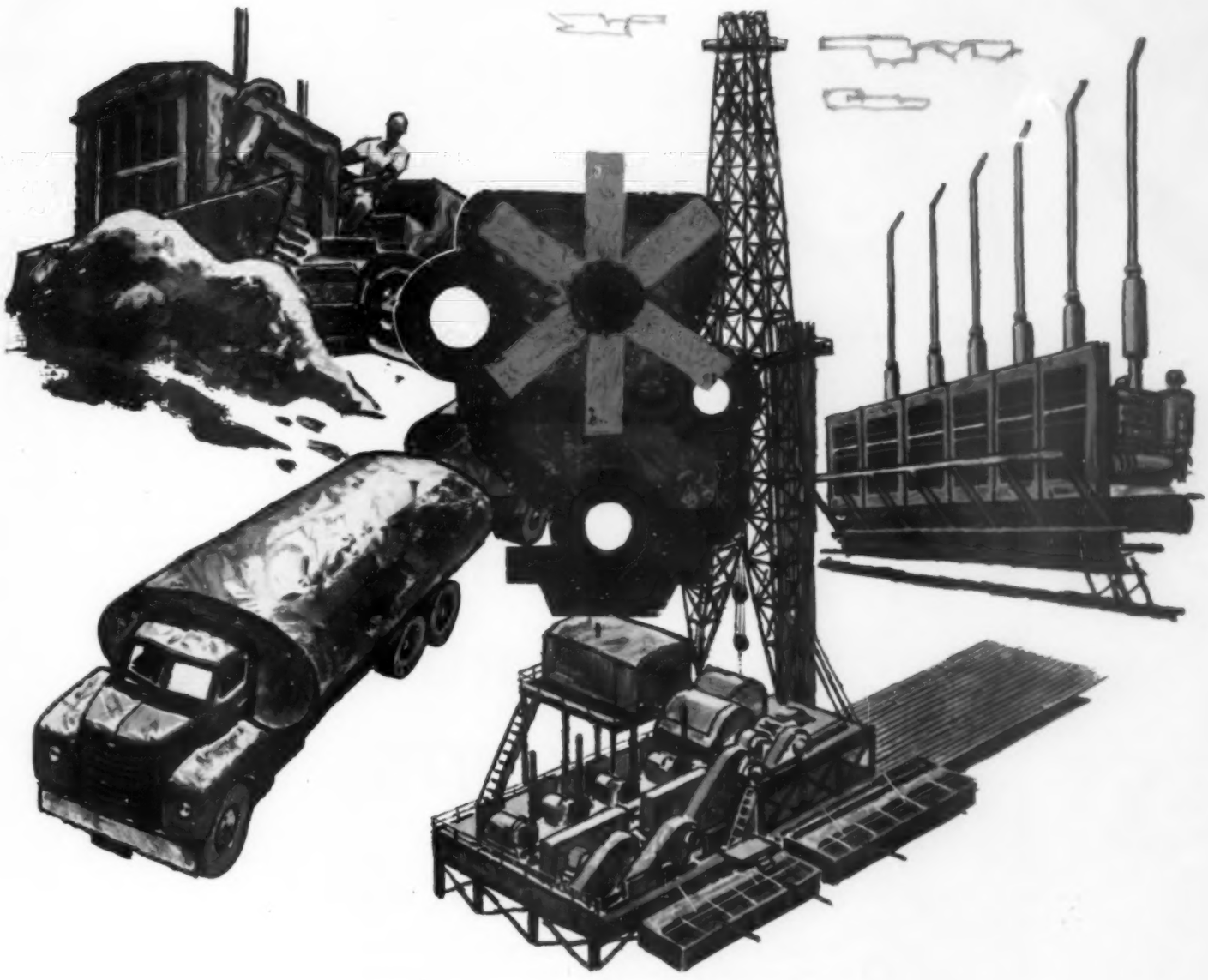
What's New in Processing Plants

Nippon Mining Co. will build a 6,000 b/d Houdriformer and an 8,000 b/d hydrodesulfurization unit at its Mizushima, Japan, refinery. Target for completion is mid-1961. Process design is by Houdry Process Corp.; basic mechanical design by Catalytic Construction Co. Niigata Engineering Co. Ltd. in cooperation with Catalytic will handle detailed design and construction.

• • •

BP Benzin and Petroleum AG will add further units as soon as the initial construction is completed on its new 4 million ton/yr Ruhr refinery at Dinslaken, West Germany. Plans include a vacuum still, a 500,000 ton/yr catalytic cracking unit, and a 100,000 ton/yr

(*Continued on page* 40)



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3 *new* HUGHES ROCK BITS

cut hole time in hardest digging

Footage and penetration rate are being substantially increased with the three new Hugheset bits, pictured on the adjoining page. They are expanding the range of formations that can be advantageously drilled by R Series bits. The three new Hugheset bits have been designed to drill specific segments of hard formations. All three are fortified on the gage surfaces with sintered tungsten carbide compacts to minimize wear and assure full gage hole.

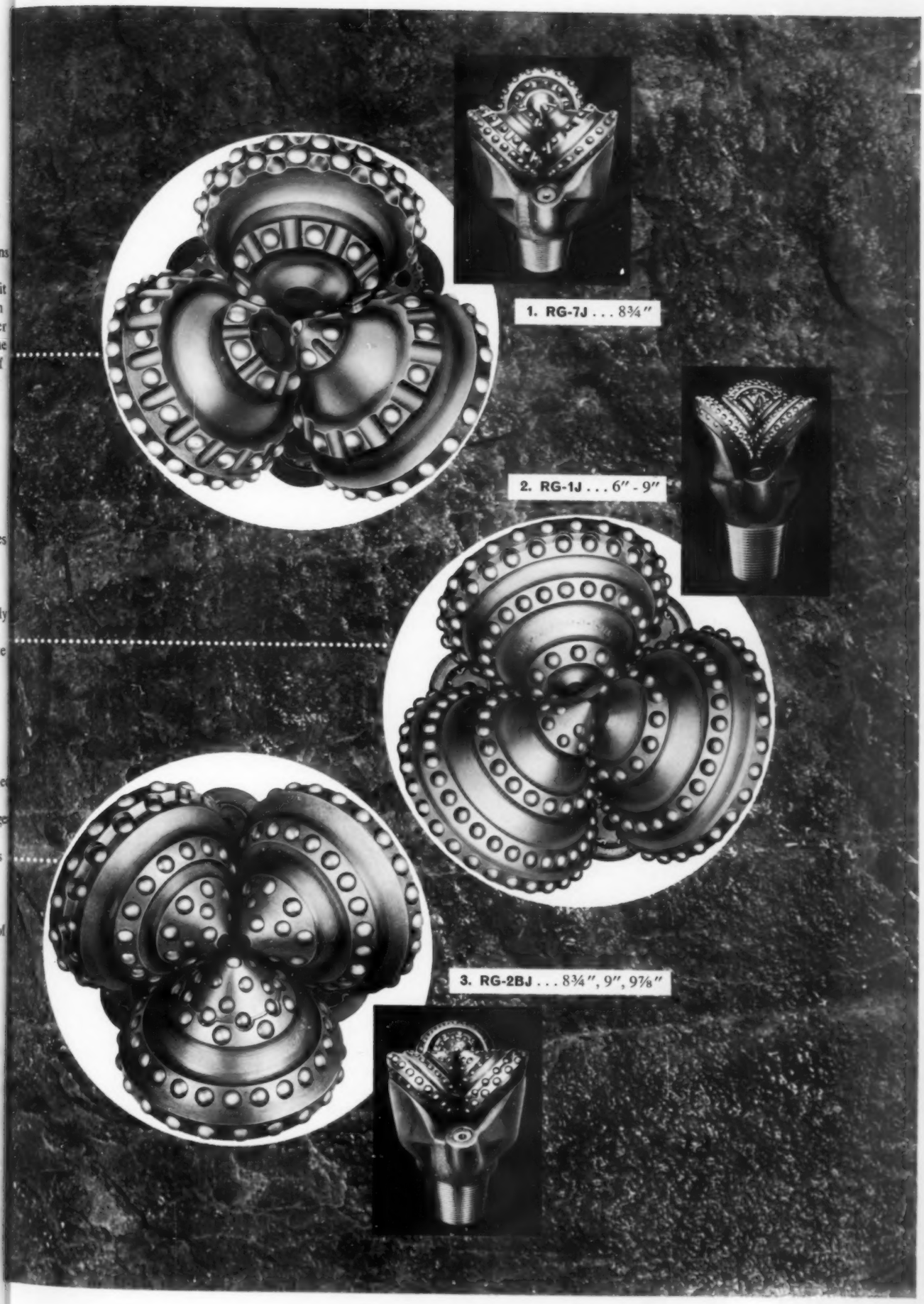
1 **RG-7J** is designed to drill the weaker or softer segment of hard formations (lime, dolomite and hard sandy shale). Design of the bit assures more action on bottom and faster penetration. Deeper intermesh, wide spacing of the compacts, and interruptions of the lands make it possible for the RG-7J to economically drill formations previously drilled by milled-cutter and R-1 bits.

2 **RG-1J** which replaces the R-1, R-1J and RG-1, is designed to drill the medium range of hard formations which are normally very abrasive. Because of its fortified gage, the performance of the RG-1J in these formations is outstanding.

3 **RG-2BJ** — identified by spearpoints on each of the three cones — has large diameter compacts and a maximum number of compacts on all rows and on the gage surfaces. It is the most rugged of the R Series bits, and is designed to drill the hardest of the hard abrasive formations, such as quartzite and hard quartzitic sands.

HUGHES TOOL COMPANY

ORIGINATOR AND WORLD'S LEADING DEVELOPER OF CONE-TYPE ROCK BITS


1. RG-7J . . . 8¾"
2. RG-1J . . . 6" - 9"
3. RG-2BJ . . . 8¾", 9", 9⅞"

bitumen plant. Contractor is Kellogg International Corp.

• • •

Continental Oil Co. will complete in January, 1961, a $2 million program to expand capacity of its 100 mmcf/d natural gasoline plant at Lake Charles, La. to 150 mmcf/d gas throughput capacity, the second major expansion at the plant in six years. Contractor is Hudson Engrg. Corp.

• • •

Standard-Vacuum and Shell Oil engineers are in Nhatrang, Central Viet Nam, to seek a favorable site for a refinery, which would be the first of its type to be built there.

• • •

Oelwerke Julius Schindler GmbH, a BP associate company, is erecting a 350 metric ton/day Edeleanu dewaxing unit at its Hamburg-Neuhof refinery. Contractor is Eleleanu GmbH of Frankfurt; completion date is 1961; cost will be $4.76 million.

• • •

The new 1 million ton/yr refinery of Purfina Mineraloelraffinerie AG at Duisburg-Neuenkamp, West Germany, has gone into full operation. Construction, handled by Lummus Nederland N.V. and Friedrich Uhde GmbH, took 18 months. Downstream units include a 150,000 ton/yr Platformer and Unifiner, 180,000 ton/yr Trickle desulfurizer for gas oil, and copper chloride sweetening on light gasoline and kerosine.

• • •

Chinese Petroleum Corp. has put onstream a new 900 b/sd sulfuric acid alkylation unit at its 35,000 b/d Kaohsiung, Taiwan, refinery. Using a Stratco contactor, the unit was designed and engineered by Badger Mfg. Co. and constructed by Badger and Chinese Petroleum.

• • •

Standard Oil Co. (Ohio) has completed a new $300,000 asphalt unit at its Lima, Ohio, refinery. It has an annual capacity ranging from 5 to 10 million gals.

• • •

Sunray Mid-Continent Oil Co. is spending $1.65 million on expansion of three gas products plants. The Carancahua Bay plant, Jackson county, Texas, is being increased by 100%, to 60 mmcf/d, at a cost of $400,000. The Benton plant, Bossier parish, La., is being revamped to increase propane recovery and produce higher quality residual products, at a cost of $500,000. Both projects, in the hands of Sunray's engineering staff, will be completed this summer. At the Criner plant, McClain county, Okla., a $750,000 addition will raise capacity from the present 5 mmcf/d to 27-30 mmcf/d. Engineering work is being done by Tuloma Builders of Tulsa.

• • •

Shell Refining (Philippines) Inc. will complete a 25,000 b/d refinery in 1962 at Tabango village, 76 miles south of Manila. Local interests will supply 25% of the total 43 million pesos capital investment.

• • •

A new 15,000 b/d, $15.5 million refinery is slated for 1964 completion in South Korea. Sites now being studied and surveyed include Mokopo, Masan, Yosu, and Ulsen. A joint venture of Korean Petroleum Co. and an undisclosed USA firm, the total expenditure includes $2.5 million in local currency.

• • •

CEPSA plans to increase capacity of its 60,000 b/d Canary Islands refinery to 72,000 b/d at a cost of $11 million.

• • •

Spanish industrialists living in the USA are expecting Spanish government approval soon for a $15 million, 30,000 b/d refinery at the port of Vigo, Galicia province.

• • •

A third bid for a new refinery in El Salvador has come from Royal Dutch/Shell. Two previous bids were from Esso for a plant at Acajutla and from joint USA, British, and local capital (already approved). Early action is expected on the Shell and the Esso bids.

• • •

SAMIR (50% ENI and 50% Moroccan capital) will complete a $14 million, 20,000 b/d refinery in 1962 at Mohammadia, a port 19 miles from Casablanca.

• • •

Refineria Petroleos de Guatemala SA, a new company, is seeking government approval to build a new plant on behalf of a group headed by Phillips Petroleum Co. The $18 million, 12,000 b/d refinery is to be near Matias de Galvez, where a 3,500 b/d plant is now being built by Shell and Beau Bridge Refining.

What's New in Petrochemicals

Chemische Werke Huels AG has acquired a license from Studiengesellschaft Kohle GmbH for a process to produce polybutadiene, using Ziegler type catalysts.

• • •

British Hydrocarbon Chemicals Ltd. expects to commission three new plants during 1961 at its Grangemouth, Scotland, works, at a total investment of approximately $14 million. One unit will double the existing capacity for butadiene, the other two are facilities for production of methanol and ethylene dichloride.

• • •

DIA-Chemieausruestungen, East Germany, has ordered a 40,000 ton/yr ethylene plant from a British group comprising Humphreys and Glasgow Ltd. and Petrocarbon Developments Ltd.

• • •

Gulf Oil Corp. has put into operation the first commercial "Hydrar" unit at its Port Arthur, Tex., refinery, for production of high purity cyclohexane from benzene. This latest addition to the company's petrochemical facilities was designed by Universal Oil Products Co. and built by Procon, Inc.

• • •

Oronite Chemical Co. will start full-scale production of an improved detergent alkylate from a recently completed plant at Richmond, Calif. Capacity was not revealed for the "multi-million dollar plant," but it was described as the "largest detergent polymer facility in the world."

• • •

A new 25 million lb/yr propylene oxide and derivatives unit will be built and operated at Priolo, Sicily, by SpA Celene, a company formed in 1957 and owned jointly by Union Carbide Corp. and Soc. Edison. Raw material will come from the adjacent plant of SINCAT.

• • •

Witfield Chemical Corp., a new venture owned jointly by Richfield Oil Corp. of Los Angeles and Witco Chemical Co., Inc., will complete and start operations in 1961 of a new $1.75 million dodecylbenzene plant adjacent to Richfield's, Watson, Calif., refinery.

• • •

Phillips Chemical Co. is expanding ethylene capacity at its Sweeny, Tex., facility. Completion, expected during the third quarter of 1961, will nearly double the current capacity of about 290 million lb/yr.

• • •

C.S.R.C.-Dow Pty Ltd. has announced plans to expand facilities at Altona near Melbourne, Australia, representing an additional investment of over $3,375,000. In addition to monostyrene, the company will manufacture ethylene dichloride, caustic soda, and chlorine.

• • •

Union Carbide Chemicals Co. has awarded a construction contract to Brown and Root of Houston for alterations at Brownsville, Texas, for completion early in 1961. The contract will result in expenditures of over $2.5 million in the area, and among new products to be made at the plant are acetic acid, acetic anhydride, and methyl ethyl ketone.

• • •

ANIC Gela SpA, a subsidiary of ENI, will build a new processing plant to handle 3 million ton/yr of heavy crude from the Gela oil field. Major products in ton/yr are as follows: LPGas, 55,000; light oils (incl. motor gasoline, kerosine, specialties), 420,000; gas and diesel oils, 700,000; fuel oils, 470,000; sulfuric acid, 110,000; ammonium sulfate, 150,000; urea, 60,000; tetrapropylene, 4,000; polyethylene, 15,000; ethaolamines and glycols, 17,000.

• • •

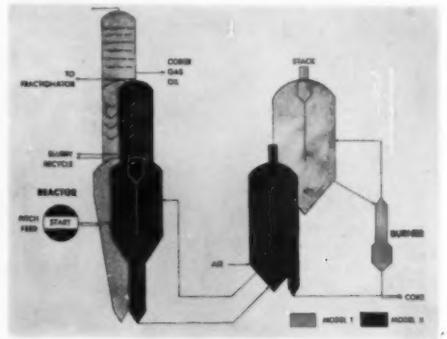
One Million Vehicles in W. Germany

Figures recently announced by the Federal Office for the Registration of Motor Vehicles show that 1,037,878 motor vehicles were newly registered in 1959 in West Germany, about 137,000 more than in 1958, or a rise of about 15.2%. Among specific types, the greatest increase was in passenger cars, up 130,000 over the 617,351 in 1958, or 21%.

Bavarian Refineries Planned

Deutsche Shell, Esso AG, and fuel suppliers to BV-Aral such as the Gelsenberg-Mobil Oil group, are making plans to construct refineries of their own in Bavaria. BP has also indicated an interest in creating its own supply for its Bavarian sales operations. Construction would take place in the next few years as soon as growth in local consumption requires it. The plants would probably be concentrated in the Munich-Regensburg area. Supply would come from Near East or North Africa via a common pipeline starting at the Mediterranean, probably a branch off the Marseilles line starting from Karlsruhe.

Present forecasts of total crude oil consumption in Bavaria are for a rise from today's level of 3.5 million ton/yr to 5.5 million ton/yr in 1965. On this basis, the annual capacity of the planned refineries can be expected to be not more than 2 million tons each in the initial stage of construction.



Esso Research's new Model II Fluid Coker is smaller, more efficient.

Model II Fluid Coking Developed

Esso Research and Engineering Co. has announced the development of Model II Fluid Coking, a new version of its original process developed and introduced in 1953.

Available under license, the new process involves a design with a more compact unit having a lower overall height and requiring a smaller plot area. The coke burner, for example, has been made 30% lower in height. Utility costs can be cut up to 35% by use of an unique waste gas turbine to drive the burner air blower and by other operating economies, including elimination of externally provided high pressure steam. Extensive engineering studies have permitted considerable simplification of the feed and recycle systems. The number of reactor feed nozzles, for example, has been reduced 67%, and certain heat exchangers and pumps were eliminated.

There are now seven Fluid Cokers with a total capacity of more than 100,000 b/d installed at such locations as Billings, Mont.; Pointe-aux-Trembles, Que.; Detroit, Mich.; Avon and Bakersfield, Calif.; Delaware City, Del.; and Hattiesburg, Miss.

New Products Guide

A comprehensive guide to the products now available from Union Carbide Olefins Co. has just been published. The 4-page booklet tabulates physical properties for 1, 3-butadiene, ethane, ethylene, methane, propylene, biphenyl, dicyclopentadiene, naphthalene, tetrahydronaphthalene, toluene, unsaturate oil, calcium hydroxide, calcium oxide, acetylene, and calcium carbide, and it outlines methods of shipment for each product. Address requests for copies of the product guide to the company at 30 East 42nd Street, New York 17, N. Y.

Wax Manufacturing

A new descriptive booklet, "Atlantic—the story behind one of the world's largest paraffin wax plants . . ." has been published recently by Badger Manufacturing Co., Cambridge, Mass.

WPRA Re-elects Carthaus

William J. Carthaus, president of Great Northern Oil Co., St. Paul, Minn., was re-elected president of the Western Petroleum Refiners' Association at its annual meeting in San Antonio.

Re-elected vice presidents were Rexford S. Blazer of Allied Oil Co., Ashland, Ky.; Walter Famariss, Jr., Famariss Oil & Refining Co., Hobbs, N. M.; J. Porter Langfitt, Pure Oil, Chicago; C. C. Tate, Phillips Petroleum, Bartlesville, Okla.; and J. A. Vickers, Vickers Petroleum, Denver, Colo.

New directors of the WPRA are R. D. Bent, Atlantic Refining Co., Philadelphia; J. C. Ducommun, Indiana Standard, Chicago; H. D. Moore, Derby Refining, Wichita, Kans.; and James Van Pelt, Berry Refining, Chicago.

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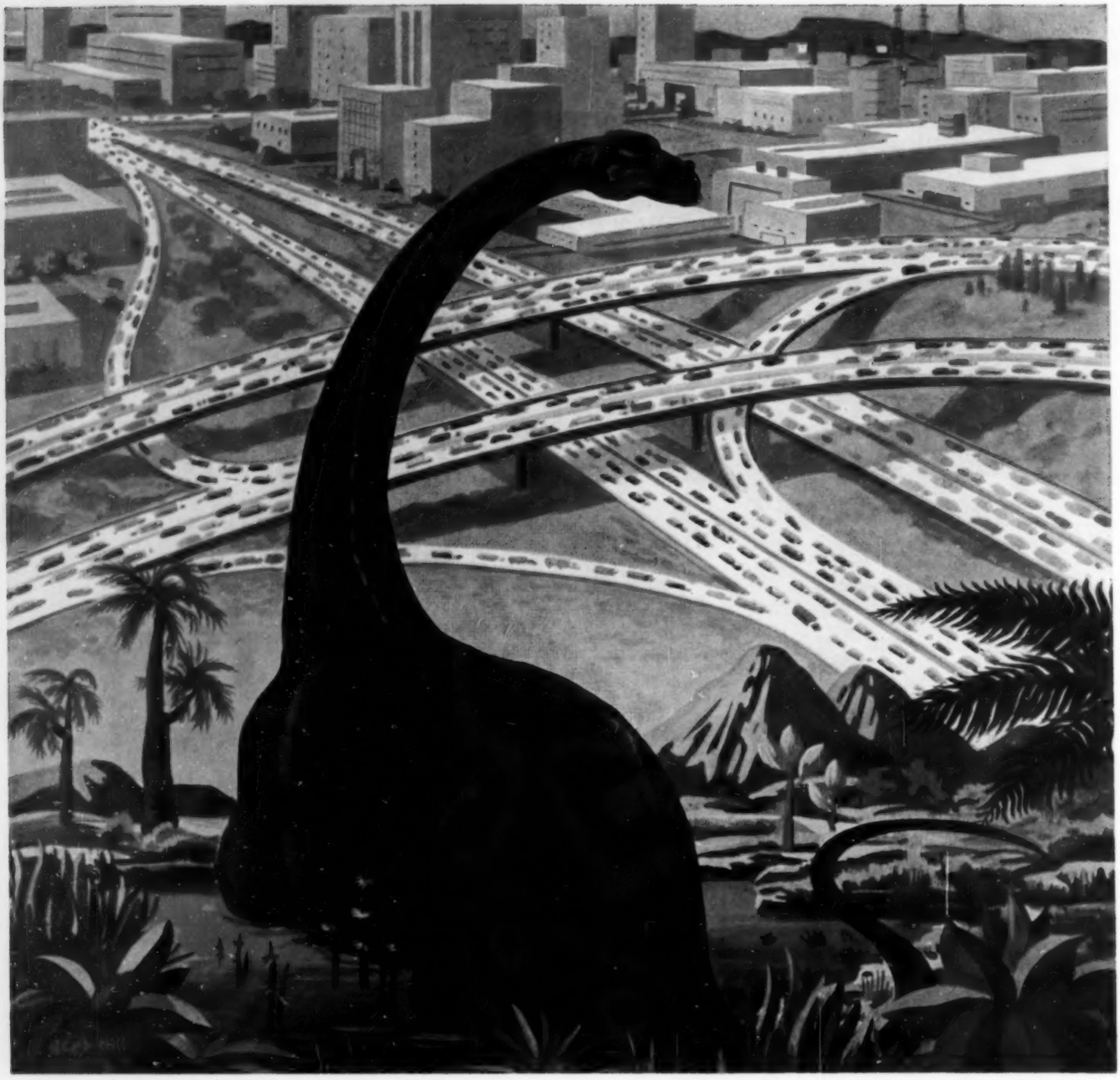

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The role of the CPA in our petroleum future

by A. O. Detmar

Chairman of the Board of Governors, Canadian Petroleum Association. President and General Manager, Mobil Oil of Canada, Ltd.

Ralph Waldo Emerson said that an institution is the lenghtened shadow of one man.

The institution in this particular case is the Canadian Petroleum Association. The shadow is that of 310 members and associate members, including allied industries, representing the exploration, development, and pipelining companies whose output represents 97% of Canada's petroleum and natural gas production.

The Canadian Petroleum Association is unlike any other North American industry trade association. Perhaps its closest relative is a Mid-Continent organization, but even there, the resemblance is only that of a distant cousin. Headquarters of the association are in Calgary, over 1,600 miles as the crow flies from Toronto, the marketing center, and still farther from Montreal, the site of Canada's largest refining capacity. Yet, for its role, Calgary is the logical center. Located there are the principal Canadian offices of nearly 200 oil and gas companies whose activities range throughout 700,000 square miles of potential oil and gas producing territory.

In Canada, as in the USA, we have many day-to-day problems which must be solved as the industry's activities range farther and farther afield. Typical examples are those encountered by firms planning stepped-up exploratory work in the far north of Canada. In the Federal Goverment's process of framing regulations relating to such matters as well spacing, lease selection, royalties and gas licenses, the association has been able to give a great deal of useful guidance relating to the search for, and development of, petroleum and natural gas under the very arduous conditions of the sub-Arctic and the Arctic.

Within the association's framework are committees specifically assigned such tasks as working with governments on conservation matters; matters of excise taxes, of surface rights—for in western Canada most of the mineral rights are owned by the Crown—safety codes, public relations, and so on. Members of these committees are selected, after nomination by member companies, for their ability and experience in a particular topic. Consequently, the successful work of these association committees in 1959 was of far more significance than the 14,880 man-hours spent in tackling industry problems. Of 68 briefs submitted to governments at all levels, 46 were accepted, four were partially accepted, 17 are pending, and only two were rejected. This is a proud record of an organization whose members participate to such an enthusiastic extent that the average attendance at committee meetings last year was 75%.

Thus, the Canadian Petroleum Association is in truth a lengthened shadow. It is vitally aware of the tremendous potential of the growing industry it represents. It is capable of whatever challenge comes along because it does represent the consolidated and hence lengthened shadow of each member.

The petroleum and natural gas search is spreading in Canada into the difficult forest and wilderness regions of the Rocky Mountains' into the far reaches of the Northwest Territories and the Artic Islands. Terrain and climate and markets plague it to the extent that 1960 may be a year of assessment and consolidation coupled with natural growth—compared to some earlier years of headlong exploration and development.

This year that I am chairman of CPA's Board of Governors, and I am firmly convinced the years beyond—after I have stepped down from this office—will be Canada's years as our industry grows in stature and as the lengthened shadow staunchly remains upon the scene.

Canada 1959 ~ a year of upturn

by Eric C. Sievwright

CANADIAN OIL MEN will probably remember 1959 as the year of the second "Borden Report", or more significantly, for the appointment of a National Energy Board which was one of the recommendations of the Royal Commission on Energy.

The National Energy Board is a Federal body, conceived as a watchdog over Canada's energy industries. While the full extent of its authority has not yet been clearly established, most people are hoping for the minimum of interference. It is argued that Canada's energy industries have developed very well since World War II, without a maze of controls, and that the years ahead can bring comparable advances given the freedom of opportunity.

The first major task of the Energy Board was to hold hearings on the question of granting export permits for Canadian natural gas to the USA. This decision might well be the greatest they will be called upon to make for many years.

The year 1959 will also be remembered for the USA Federal Power Commission's decision to permit imports of Canadian natural gas into the US Midwest. This is a most significant step in the direction of a continental energy policy towards which both Canada and the United States must aim. Another gratifying move in this area was the decree granting exemption to Canadian overland crude movements in the US petroleum imports program. Considerations of both political and economic security indicate that North American energy resources should come under a continental energy policy.

In Canada crude production gained by 8.5%, and consumption of petroleum products by 8.7%. Despite this substantial production increase, which compared favorably with an estimated 5.1% in the USA, 6.3% in Venezuela and 5.0% in the Middle East, there were still the prophets of doom who advocated sweeping government measures. It seems clear that 1958 was the year of transition from the post-war and post-Leduc boom, to more normal growth trends, indicating a solid basis for economic development at large and a healthy coming-of-age for the oil industry in Canada.

Crude Production increased from 468,000 b/d in 1958 to 508,000 b/d in 1959, an 8.5% gain. (See Table 1.) All areas except Manitoba moved ahead, the largest increase accruing to Alberta, which gained by 31,000 b/d, or 9.6%, to reach 355,000 b/d. Saskatchewan was second with a 10,000 b/d gain, or 8.1%. The largest single market for Canadian crude was still Ontario which took 200,000 b/d, or 39.4% of the total, compared to 164,000 b/d, or 35.0% last year. (See Table 2.)

The Prairie Provinces are their own second best customer, taking 151,000 b/d in 1959, up from 146,000 b/d in 1958. Ontario now takes 33.8% of all Alberta production and 51.9% of the Saskatchewan total. Exports to the USA rose to 91,000 b/d from 86,000 b/d, but still did not approach the abnormally high levels of 1956 and 1957. Ontario crude production received a boost with the completion of the fifth of a six-well development program at Colchester in the Southwest corner of the Province. This well, with an initial flow rate of 1,000 b/d, has an estimated production rate of 300 b/d, 10% of total current production in the Province, and is one of the best wells ever drilled in Ontario.

Drilling activity in Western Canada has declined steadily from the peak level of 1956, when 3,285 completions were reported. 1959 was down slightly from 1958; 2,516 completions compared with 2,595, but there is a strong feeling that activity will level off here and begin a modest recovery. Development drilling, largely a function of current demand, has been the most affected since 1956, falling from 2,635 completions to 1,938 in 1959. Wildcat drilling increased in 1957, but by 1959, the number of completions totaled 578 compared with 650 in 1956. (Table 3.)

1959 completions recorded 1,417 oil wells, 312 gas and 787 dry holes. (Table 4.) Alberta once again dominated the picture with 871 oil and 257 gas, but British Columbia's 45 gas wells out of 110 total drilled is worthy of note. There seems little doubt that northern B.C. is to become one of Canada's leading natural gas sources. There were 280 wells drilled in Ontario during the year, resulting in three oil and five gas discoveries, 107 wildcat dry holes, 16 field oil wells and 54 dry development wells. The remaining 29 completions were service wells.

On Jan. 1, 1960, the Province of Alberta introduced a new prorationing formula designed to give more emphasis to producibility on an MPR basis by calculating residual demand, or MPR less economic allowance. It had been suggested that the old method failed to allow adequately for producibility of individual wells and supported marginal wells with high economic allowance production.

◄ *British American's gas discovery at Lookout Butte, Alta., had an indicated open flow potential of 31 mmcf/d, was drilled to a depth of 12,648 ft.*

About the author

E. C. Sievwright, vice president, Economic Research Corp. Ltd., is a graduate of London University and McGill University. He was elected a Director of E.R.C. in January of this year and is now in charge of their Toronto office. Prior to joining E.R.C. he was with Shell Oil Co. of Canada, Ltd. for six years, most recently as assistant to the vice president, transportation and supplies. Mr. Sievwright has authored or co-authored this annual economic review article for WORLD PETROLEUM for the past two years.

Highlights:

Crude oil production up 8.5%, natural gas production rose 36.8%, refining capacity increased 6.6%, total product demand went up 7.7% with Ontario remaining the key demand area, crude imports rose 5.1% and the industry entered 1960 awaiting decision on natural gas exports by newly created National Energy Board.

Another view of the Shell-Cal Standard Moose Mountain 16-6 well in the rough country of southern Alberta.

Above: Shell-Cal Standard Moose Mountain 16-6, in southern Alberta. Photo courtesy Shell Oil Co. of Canada Ltd

Right: the extremely difficult terrain, unusual topography, and absence of roads in Alberta's mountain and foothills belt are demonstrated in this autumn view of Shell Oil Co. of Canada Ltd.'s Waterton 6 development well on a rugged mountain side.

Supply and Demand: Total Canadian demand for oil in 1959 was 815,000 b/d, up 7.7% from 1958. (Table 5.) With domestic crude production of 508,000 b/d, crude imports of 307,000 b/d and product imports of 92,000 b/d, this permitted crude exports of 91,000 b/d to the USA. Thus while domestic crude production increased by 8.5%, total imports and exports gained by 5.8% and 6.8% respectively, compared to 1958.

Imports of crude, up 5.1%, were confined to Eastern Canada; and more than two-thirds came from the Caribbean, predominantly Venezuela. The largest increase was, however, from the Middle East which moved up from 84,000 to 100,000 b/d, to improve its share from 28.8% to 32.6% of all Canadian crude oil imports. (Table 6.) Despite this increase, the ratio of foreign crude to refining capacity in Eastern Canada declined by 1.2%.

Pipe Lines: About 2,700 miles of natural gas line was laid during 1959, 63% of which was in Saskatchewan and Alberta. Trunk, gathering and utility distribution systems accounted for the bulk of the work which was about 30% below the record levels of 1958, an unusually high year because of the major Trans-Canada construction activity.

There were only 100 miles of crude line laid compared with 600 miles in 1958. All the 1959 crude oil projects were located in Western Canada. With the Trans-Canada system barely completed, plans are now ready for a three-year looping and expansion program in Western Canada starting in 1960, subject to gas export permits.

In Eastern Canada, 1959 saw the beginning of natural gas transmission and distribution in the Province of Quebec, and plans are underway to extend the service beyond the City of Montreal, the present eastern limit of natural gas in Canada. There has also been some study of the possibility of moving North Dakota crude into Canada to join the Interprovincial Pipe Line running east and then south to the Twin Cities of Minnesota. Some 10,000 b/d was reported to be involved.

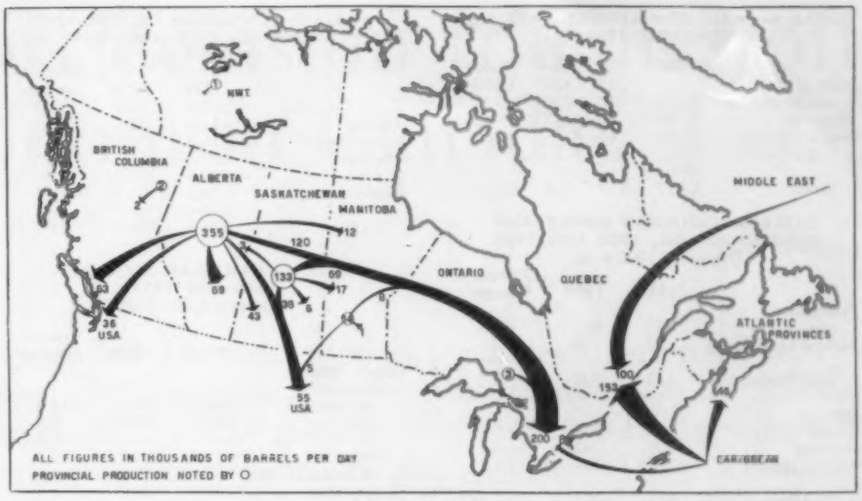
Oil pipe line deliveries in 1959 were 12.2% higher than 1958, and totaled 308.4 million bbl. (Table 7.) Records were set in every Province except British Columbia, which still has to equal the exceptionally high level of deliveries of 1957.

Refinery Operations: The crude handling capacity of Canadian refineries increased by 55,000 b/d, or 6.6%, in 1959, compared to an average annual gain of about 11% since 1950. (Table 8.) Once again the largest additions were in Ontario, which accounted for 35,000 b/d, or 63.6% of the total increment. By year-end, 63.8% of all Canadian refinery capacity was accessible to domestic crude supplies by pipeline and 57.4% of actual crude receipts were from Canadian sources. Total receipts of crude increased from 661,100 b/d to 721,300 b/d, or 9.1%, while receipts of Canadian crude gained by 12.3%, from 368,800 to 414,300 b/d. The percentage utilization of capacity increased from 78.9% in 1958 to 80.8%, reflecting the slowing down in construction of new facilities.

In the last few years, Ontario has emerged as the balance wheel of Canadian oil demand. This province, with its rapidly growing population and industrial base, has emerged as the largest single area of demand for Canadian crude, its 200,000 b/d accounting for 39.4% of total 1959 Canadian crude production (508,000 b/d), and 48.0% of all domestic demand (414,000 b/d). As increased refinery capacity in the province has become available, the additional production has backed out foreign crude products from Montreal.

Thus, while total Canadian refining capacity increased by 75% between 1953 and 1959, Ontario capacity doubled. In 1959, as Canadian refineries in total added 6.6% capacity, Ontario refineries added 14.8%. Since all Ontario refineries, with one small exception, are linked to Western Canada oil sources by trunk pipeline, demand increases in Ontario are reflected by substantial gains in crude production in the Western Provinces. Thus in 1959, Ontario receipts of Canadian crude increased by 21.1% compared to 12.3% for all Canada. Furthermore, Ontario refiners accounted for 76.5% of the increase in domestic demand for Canadian crude during 1959.

Product Demand: Demand for all petroleum products in Canada during 1959 increased by 8.7% over the previous year. (Table 9.) Outstanding gains of 12.0% were recorded by light and heavy fuel oils due to the abnormally cold winter and strong recovery in industrial production from the reduced levels of 1958. Motor gasoline demand increased by 5.1%, close to the long-range trend for this product.



Disposition of Canadian crude oil production and foreign imports, 1959.

TABLE 1—CANADIAN CRUDE PRODUCTION 1958 AND 1959
(Figures are in 1000 b/d)

	1958	1959	Percent Increase
Alberta	324	355	9.6
Saskatchewan	123	133	8.1
Manitoba	16	14	−12.5
British Columbia and N.W.T.	3	3	—
Ontario	2	3	50.0
Totals	468	508	8.5

Note: Figures include natural gas liquids.

TABLE 2—DISPOSITION OF CANADIAN CRUDE OIL PRODUCTION—1959
(Figures are in 1000 b/d)

Source	Brit. Col. and N.W.T.	Alta.	Sask.	Man.	Ont.	USA Pacific North-West	USA Mid-Cont.	Total
British Columbia and N.W.T.	3	—	—	—	—	—	—	3
Alberta	63	69	43	12	120	36	12	355
Saskatchewan	—	3	6	17	69	—	38	133
Manitoba	—	—	—	1	8	—	5	14
Ontario	—	—	—	—	3	—	—	3
Total	66	72	49	30	200	36	55	508

Note: Figures include natural gas liquids.

TABLE 3—DRILLING ACTIVITY IN WESTERN CANADA, 1956 TO 1959
(Number of Wells Completed)

	Development				Wildcat				Total			
	1956	1957	1958	1959	1956	1957	1958	1959	1956	1957	1958	1959
Alberta	1,543	1,063	1,314	1,237	321	354	330	351	1,864	1,417	1,644	1,588
Saskatchewan	839	961	600	599	262	270	177	172	1,101	1,231	777	771
Manitoba	218	160	78	33	44	64	13	14	262	224	91	47
British Columbia and N.W.T.	35	55	38	69	23	36	45	41	58	91	83	110
Totals	2,635	2,239	2,030	1,938	650	724	565	578	3,285	2,963	2,595	2,516

TABLE 4—WELL COMPLETIONS—WESTERN CANADA, 1959

	Oil	Gas	Dry	Total
Alberta	871	257	460	1,588
Saskatchewan	496	10	265	771
Manitoba	30	—	17	47
British Columbia and N.W.T.	20	45	45	110
Totals	1,417	312	787	2,516

TABLE 5—CANADIAN SUPPLY AND DEMAND FOR OIL, 1958 AND 1959
(Figures in 1000 b/d)

	1958	1959	Percent Change
Production:			
Crude	455	495	+8.8
Natural Gas Liquids	13	13	—
Total Production	468	508	+8.5
Imports:			
Crude	292	307	+5.1
Products	85	92	+8.2
Total Imports	377	399	+5.8
Total New Supply	845	907	+7.3
Exports:			
Crude	86	91	+5.8
Products	2	3	+50.0
Total Exports	88	94	+6.8
Domestic Demand:	757	815	+7.7
Total Demand:	845	909	+7.6

TABLE 6—CRUDE OIL IMPORTS INTO EASTERN CANADA, 1958 AND 1959
(Figures in 1000 b/d)

	1958	1959
Source of Imports:		
Venezuela	199	199
Trinidad	5	7
Middle East	84	100
USA	4	1
Totals	292	307
Distribution:		
Maritimes and Quebec	284	299
Ontario	8	8
Total Eastern Canada	292	307
Refining capacity in Eastern Canada[1]	549	590
Crude imports into Eastern Canada as % of refining capacity[1]	53.2	52.0

[1] At year end.

Sales of new motor vehicles in 1959 were 12.1% higher than in 1958, but still slightly below the 1956 peak. The 1959 total was 498,776 units, compared to 444,769 in 1958. Sales of imported vehicles increased by 41.3% from 83,863 to 118,513 units. Thus, these foreign models accounted for 23.8% of total sales compared with 18.9% in 1958, and 5.7% as recently as 1955. As a reflection of this trend, motor gasoline sales ratio in Eastern Canada is now 70% regular to 30% premium, while the average regular gasoline is 92-93 Research Octane Number and premium is just over 99 RON.

The 12.0% increase in intermediates is even more gratifying in view of the increasing availability of natural gas in Eastern Canada during the year. By mid-1959, there were 627,000 homes heated with gas in Canada, 14.6% of all dwellings (Table 10.) Oil still had a commanding lead with 54.3% of the total.

The year was marred by a series of motor gasoline price wars in Eastern Canada, with both premium and regular being affected.

TABLE 7—CANADIAN OIL PIPE LINE DELIVERIES, 1958 AND 1959
(Million barrels)

	1958	1959	Percent Increase
British Columbia	29.6	35.9	21.3
Alberta	16.2	22.7	40.1
Saskatchewan	16.3	18.5	13.5
Manitoba	10.7	11.0	2.8
Ontario	123.6	136.0	10.0
Quebec	78.5	84.3	7.4
Totals	274.9	308.4	12.2

TABLE 8—CANADIAN REFINING—1958 AND 1959
(Figures in 1,000 b/d)

	1958	1959	Percent Increase
Canada Total:			
Crude intake:			
domestic	368.8	414.3	12.3
imported	292.3	307.0	5.0
Total	661.1	721.3	9.1
Crude intake capacity	838.0	893.0	6.6
% Utilization	78.9	80.8	
% of Canadian refining capacity accessible to domestic crude	62.2	63.8	
Ontario:			
Crude intake:			
domestic	165.2	200.0	21.1
imported	11.2	8.0	−28.6
Total	176.4	208.0	17.9
Crude intake capacity	236.0	271.0	14.8
% Utilization	74.7	76.8	
% Runs from domestic crude	93.7	96.2	
Ontario as % of demand for domestic crude	44.8	48.0	
Ontario as % of demand for imported crude	3.8	2.6	

The outcome was a new level about 4c/gal., or 10% below the previous average. Long gasoline inventories in the spring were probably caused by additional crude runs to satisfy abnormal heating oil demand. With natural gas beginning to absorb an increasing share of the heating market, there may in the future be less pressure on heating oil imports and excess winter crude runs. This in turn would lead to lower rates of gasoline inventory accumulation, and could conceivably eliminate some of the forces behind gasoline price wars in Eastern Canada.

Natural Gas sales in 1959 increased by 36.8% over the previous year. The largest percentage gains were made by Manitoba and Quebec, but in absolute terms, Ontario accounted for 31.9 billion cubic feet or 42.0% of the total increase in sales. (Table 11.)

The largest gain was made in industrial sales which increased by 49.5% over the year, while domestic and commercial sales moved ahead by 31.1% and 16.7% respectively. In 1959, half of all natural gas sales in Canada were made to industrial accounts.

Gas export permits were the principal topics of discussion during the year. To speed up proceedings before the National Energy Board, six separate applications for gas export were combined into one proposal —to export 850 mmcfd. With the granting of such export permits, a capital expenditure program of some $700 million would

TABLE 9—DEMAND FOR PETROLEUM PRODUCTS IN CANADA, 1959 AND 1959
(Figures in 1000 b/d)

	1958	1959	Percent Increase
Motor gasoline	257	270	5.1
Intermediates	249	279	12.0
Heavy fuel oil	140	157	12.1
Other	113	119	5.3
Totals	759	825	8.7

Note: partly estimated.

TABLE 10—HOME HEATING IN CANADA

	Number of Dwellings (000's)	Percent of Total
Oil	2,337	54.3
Natural Gas	627	14.6
Coal and Coke	691	16.1
Other	648	15.0
Totals	4,303	100.0

Note: Data as of May 1959.

TABLE 11—SALES OF NATURAL GAS IN CANADA, 1958 AND 1959
(Billions cubic feet)

	1958	1959	Percent Increase
By Province:			
British Columbia	11.6	19.2	65.5
Alberta	116.2	136.1	17.1
Saskatchewan	20.5	30.4	48.3
Manitoba	4.1	8.3	102.4
Ontario	51.1	83.0	62.4
Quebec	2.9	5.3	82.8
	206.4	282.3	36.8
By Type of Sale:			
Domestic	75.2 (36.4%)	98.6 (34.9%)	31.1
Industrial	93.4 (45.3%)	139.6 (49.5%)	49.5
Commercial	37.8 (18.3%)	44.1 (15.6%)	16.7
	206.4 (100.0%)	282.3 (100.0%)	36.8

be set in motion and Canada's adverse trade balance with the USA would be improved by as much as $100 million per year. Alberta's proven gas reserves now total 26.9 trillion cubic feet. Despite this, the cumulative income from natural gas production in Western Canada between 1947 and 1959 has only contributed 2.8% of total oil and gas revenues.

Outlook: 1960 awaits the decision of the National Energy Board on the question of natural gas exports. A favorable verdict would not only set off a multi-million dollar construction program, but also the additional gas revenues would do much to offset rising oil-finding costs, especially in Alberta. The Borden Commission in its Second Report suggested that crude production be raised to 700,000 b/d by the end of 1960. This seems a high target even acknowledging the strenuous efforts being made by refiners in Eastern Canada to use more domestic crude. These efforts, incidentally, have been underway for several years. The rate of crude production might be running as high as 625,000 b/d by the end of 1960, with the average for the year approximating 590,000 b/d, or 16.0% above the 1959 level. One of the major problems to be faced in 1960 will be provision for the economic utilization of the sulfur and natural gas liquids which will be produced in substantial volumes as natural gas production in Alberta increases. END.

Export decision touches off gas boom in Canada

by Leslie Orr Rowland

A major expansion in Canada's natural gas industry is now a certainty. The Canadian federal government has approved recommendations by the National Energy Board for the export of gas to the United States. Five permits were granted to four major gas transmission companies, and four of these permits now must still obtain an approval by the U. S. Federal Power Commission, expected as a formality.

The permits granted were as follows:

- Trans-Canada Pipe Lines Ltd., export at Emerson, Manitoba, 204 mmcf/d, 20-year term, initial price 30.23¢, average price 30¢.
- Trans-Canada Pipe Lines Ltd., export at Niagara Falls, Ontario, interruptible only, maximum 204 mmcf/d, limited to five years and expires on December 31, 1965, price 37¢.
- Alberta and Southern Gas Co. Ltd., export at Kingsgate, B.C., 458.75 mmcf/d, 25-year term, initial price 25.11¢, fifth year 27.38¢.
- Westcoast Transmission Co. Ltd., export at Kingsgate, B.C., 152 mmcf/d, 20-year term, initial price 25.66¢, fifth year 26.63¢.
- Canadian Montana Pipeline Co., export at Coutts, Alta., 36 mmcf/d, 25-year term, initial price 22.63¢ fifth year 24.96¢.

The 20-year license asked by Trans-Canada for export of 204 mmcf/d through Niagara Falls on an interruptible basis was reduced to 5 years and a requirement imposed that Canadian demands be given first priority. Interpretation is that this will be of no practical value to Trans-Canada; it is therefore not considered accountable in calculating export volume.

EVEN THOUGH NATURAL GAS failed to come up to expectations, 1959 was by far the most successful and encouraging year in the history of the Canadian petroleum industry. The clouds surrounding economic use of the gigantic gas reserves of western Canada parted slightly as completion of the Trans-Canada pipeline to eastern Canada allowed production to score a record-breaking increase to a new peak volume. Hopeful for 1960 as well, president N. E. Tanner of The Canadian Gas Association predicts that 100,000 new gas services will be installed this year.

The outstanding disappointment of last year was the failure of the dominion government to sanction large scale gas export, as recommended by the Borden Royal Commission in the fall of 1958.

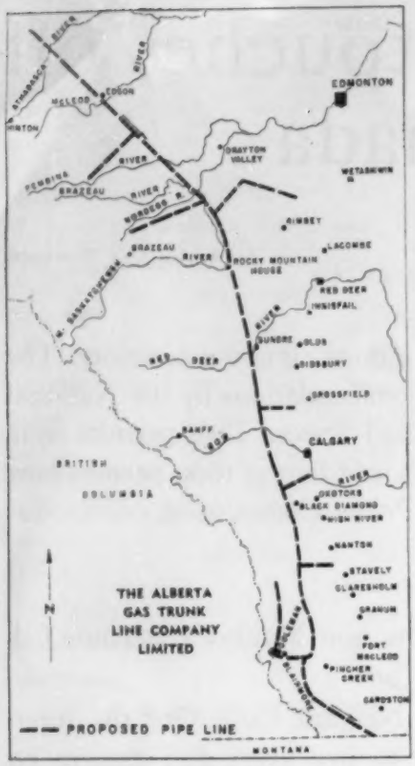
This situation now has been cured by the National Energy Board's authorization in April to four companies to export 6,529 billion cubic feet of gas over periods up to 25 years to the USA. The volume is less than ⅕ of Canada's proven gas reserves. More than 95% will move from Alberta.

The four companies given approval on exports totals include Trans-Canada Pipe Lines Co. Ltd., 1,410 billion cu ft; Alberta and Southern Gas Co. Ltd., 3,826 billion cu ft; Westcoast Transmission Co. Ltd., 1,020 billion cu ft and Canadian Montana Pipe Line Co., 273.7 billion cu ft.

Trans-Canada, the only applicant prepared to export gas this year, will sell up to 204 million cu ft to Mid Western Gas Transmission of Houston, Texas. The latter will take delivery at Emerson, Manitoba and sell it to the USA midwest area.

Trans-Canada already has approval from the U.S. Federal Power Commission.

Alberta and Southern, a subsidiary of Pacific Gas and Electric of San Francisco, will export 458 mmcf/d mainly to the San Francisco Bay area. Delivery will be made through construction of 1,400 miles of 36-inch pipeline at a cost of $337 million.



Alberta Gas Trunk Line Co.'s propored $103 million foothills division, half of which is planned for construction this year and the balance in 1961.

Canadian Montana, a subsidiary of Montana Power, will use the facilities of Alberta and Southern and will take up to 36 mmcf/d during the 25-year period.

Westcoast Transmission, which already exports gas at the British Columbia-U.S. border to points in the Pacific northwest, will ship 152 mmcf/d. It will also use Alberta and Southern pipeline facilities which will be hooked up with other US pipelines.

These three companies are obliged to start export by Dec. 31, 1961.

FPC's approval of the above three companies' applications is expected to be a formality.

The NEB approval has triggered a development boom estimated at $180 million for this year alone. Plans are being put into action on pipelines, processing plants and development well drilling.

According to a Canadian Petroleum Association spokesman, NEB's approval will tap more than 1,000 capped gas wells in Alberta. He estimates that $6.8 billion will be spent for oil and gas development programs in the next ten years.

Key pipeline and gas company officials estimate some $250 million spending on transmission systems in Canada and more than $400 million for gas field development work, processing plants and other units within the next three years.

The Alberta-California project will require at least two years of construction and it is estimated that when gas is "on stream" in 1961 or 1962 it will bring more than $2 million per month to 49 top gas producers in Alberta.

The ten top producers contracted to Alberta and Southern Project include: The British American Oil Company Limited, Pan American Petroleum Corporation, Texaco Exploration Company, Canadian Fina Oil, Mobil Oil of Canada Ltd., Shell Oil Company of Canada Limited, Sun Oil Company, Imperial Oil Limited, Hudson's Bay Oil & Gas Company Limited, and The California Standard Company.

Hudson's Bay, B-A, Canadian Delhi Oil Co., Home Oil Co., Provo Gas and Tennessee Gas Transmission will be the major gas suppliers to Trans-Canada Pipe Lines.

Natural gas production in 1959 broke all previous records to set a new high mark of 495 billion cu ft gross and 435 billion net saleable gas, an increase of 29% to 1,189 mmcf/d. Gross production was up 76 billion cu ft from the 1958 figure of 419 billion, but net saleable output gained 97 billion because of the enormous advance in conservation of oil field casinghead gas as new plants went on stream late in 1958.

Alberta led the parade with a big gain to 310.8 billion cu ft saleable gas, from 239 in 1958, while gross production rose to 352.7 from 294.4 billion. The huge Pincher Creek conservation plant of The British American Oil Co. Ltd. and the Pembina oil field gas recovery plant system installed by Goliad Ltd. went on stream.

Saskatchewan had the next largest gain, to 54 billion cu ft gross from 42.5 in 1958, while its net saleable production soared to 37.4 from 20.2 billion. British Columbia had a steadier rate of growth to 70 from 64 billion. As B. C. gas is almost all non-associated and not subject to field waste to any noticeable extent, its net production was almost identical to the gross, gaining to 68.8 from 63.2 billion cu ft. Ontario and the minor producing provinces accounted for the balance of production.

Total waste was reduced last year to 60 billion cu ft from the 1958 figure of 81 billion.

The 1960 increase in Canadian gas production is expected to be much less spectacular, ranging from 10 to 15%. No pipeline projects for export markets can be finished in time to have any material effect and no extensions will be made to large new bulk markets within Canada, such as occurred in 1958.

Utilization of natural gas by local utility companies was the dominant factor in expanding 1959 production. Completion of the Trans-Canada pipeline to eastern Canada in November 1958 permitted Northern Ontario Natural Gas Co. Ltd. to have its large distribution system operating throughout 1959. Its territory stretches 1,100 miles, from the Manitoba border through northwestern and north central Ontario as far south as Orillia. Northern's sendout passed 100 mmcf/d for the first time last December and reported an increase of 44% in deliveries over December 1958 in spite of weather that was 10% milder.

Northern installed 10,000 new services on its vast system in 1959 and now has 40% of the entire available commercial and industrial market in its area. It expects to achieve saturation of this market within two years.

Northern has secured full protection of supply through an agreement with Trans-Canada Pipe Lines Ltd. In return for the withdrawal of Northern's intervention in the Trans-Canada export hearing, Trans-Canada agreed to sell 160,545 mmcf to Northern under a 17-year contract. The total value is $66,103,000 and the average price of about 41 cents per mcf is 3.25 cents above the price stipulated in the original contract. Trans-Canada had previously declined to sign a long-term contract at a fixed price.

A supplementary contract was also signed for delivery of up to 79 mmcf/d with no minimum quantity committed. The price is to be determined at the time delivery is requested. It will be based on a weighted average of Alberta field prices at that time.

Greater Winnipeg Gas Co. added 11,000 services. In eastern Canada the two major utilities, Consumers' Gas Co. and Union Gas Co. of Canada Ltd., both had extensive programs of expansion, including new services in existing franchise territory and extension of operations into new cities and towns not previously served.

In the Vancouver area of British Co-

(Continued on page 88)

Table 1—Estimated proved recoverable natural gas reserves in Canada

(Canadian Petroleum Association Compilation as of Dec. 31, 1959)

(Millions of cubic feet—14.65 psia, at 60 F)

	Reserves as of Dec. 31, 1958	Changes in Reserves during 1959: Extensions and Revisions	Discoveries of New Fields & New Pools in Oil Fields	Net Increase in Underground Storage	Net Production	Reserves as of Dec. 31, 1959
Northwest Territories	29,427	2,923	—	—	287	32,063
British Columbia	1,687,626	334	203,281	—	66,003	1,825,238
Alberta	20,222,824	2,897,819	533,089	1,222	354,285	23,300,669
Saskatchewan	1,165,003	69,907	53,995	3,925	57,238	1,235,592
Manitoba	2,345	48	—	—	434	1,959
Ontario	186,783	12,411	295	29,134	19,656	208,967
Quebec	83	−83	—	—	—	—
New Brunswick	961	3	—	—	116	848
Total Canada	23,295,052	2,983,362	790,660	34,281	498,019	26,605,336

Latest addition to petroleum skyline of Montreal is British Petroleum's new 25,000 b/d refinery at Ville d'Anjou. Seen here are catalytic cracking, catalytic polymerization and treating units.

BP's Montreal refinery is compact and efficient

When British Petroleum's new Montreal refinery came on stream last month, it became the 15th operating refinery in the BP group around the world. Of even greater significance, perhaps, it marked the opening of BP's refining activities in the Western Hemisphere and the direct implementing of its new young and rapidly growing marketing activities in Canada.

To fit in with the marketing picture, BP Refinery Canada Ltd., a company formed to refine crude oil for BP Canada Ltd.—the marketing company—planned the building of the Montreal refinery in two stages.

The first stage was designed and engineered by BP to handle oil prior to the commissioning of the refinery proper. It consisted of a 1½-mile buried products pipe route to the St. Lawrence River, and a transit site and wharf on the river, together with certain essential services such as fire-fighting facilities and drainage. The second stage, which consists of all the other necessary operating facilities, including the process units, was the responsibility of The Lummus Co. of Canada Ltd., prime contractors for the project.

The first stage was completed by the summer of 1959, and the second by the end of this past March, so that the plant could pick up the market load at the beginning of this June.

For the refinery, BP acquired a 600-acre site in Ville d'Anjou, about 10 miles east of Montreal and three miles from the St. Lawrence. At present, however, only a little over one-third of the available land is being used for the refinery and the tank farm. In addition to this property, BP owns land for transit tankage adjacent to the St. Lawrence River, and also on the intervening pipe route.

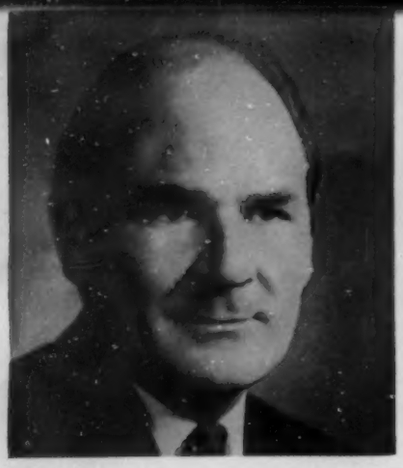
The refinery was designed basically to make a simple range of products—premium and regular grade gasolines, heating oil, diesel fuel, furnace oil, heavy fuel oil, and propane. The two main objectives of this design were a high yield of gasoline and low pour points for the middle distillates.

To meet these requirements the major process units comprise the following: 25,000 b/sd crude and vacuum distillation (engineering design by Lummus); 12,000 b/sd distillate hydrotreater (engineering design by Lummus); 9,000 b/sd catalytic cracking unit (engineering design of the reactor section by Universal Oil Products, of the recovery and treatment sections by Lummus); 800 b/sd catalytic polymerization unit (engineering design by UOP); and 6,000 b/sd catalytic reformer (engineering design of reactor section by UOP, of fractionation section by Lummus).

The emphasis was on economy in capital costs throughout the design stages. For example, flow between the process units is normally very direct, thereby reducing the need for intermediate tankage. This has been cut down to the minimum required to allow a 3- or 4-day operational shutdown of a major unit (for example, catalyst regeneration) without bringing down the entire plant. (See plot plan in Fig. 1). Although the units are not integrated in the sense that there is heat exchange between one and another, the plant is essentially one compact unit, and the whole refinery will be shut down during turnarounds. Even though "gold-plating" has been eliminated, BP has not lowered its rigid specifications for safety.

Facilities have been installed to receive crude oil from the Middle East and Trinidad either by tanker or by pipeline. Products will be shipped by road, rail, river, or pipeline.

The process plant is closely integrated. However, it is arranged so that surge drum capacity between consecutive process units



T. G. McLintock, vice president and managing director, BP Canada Ltd.

J. A. Riddell-Webster, vice-president—marketing, BP Canada Ltd.

H. L. Ray, now in BP's London headquarters, was general manager of BP Refinery Canada Ltd. during the planning and construction period.

has about 30 minutes' capacity. This serves to iron out flow irregularities and gives time for action in the event of an emergency.

Units are arranged on either side of a central overhead pipe rack, beneath which are the pumps. A common control room monitors all the units, and all instrumentation is electronic. Most pumps and compressors are electrically driven except for those on such vital duties as cooling and fire water, boiler utilities, catalytic cracking unit blower, and catalytic reformer compressor. All these latter are steam driven. This arrangement makes sure that in the event of a prolonged power failure it will be possible to shut the refinery down in a safe and orderly manner.

A simplified block flow diagram is shown in Fig. 2. The crude and vacuum unit employs two-stage distillation to split incoming crude oil into several components suitable for downstream processing or for product blending.

In the distillate hydrotreater, the transfer lines from furnace to reactor have been aluminized as an anti-corrosion measure, and the furnace tubes and heat exchangers have been constructed of stainless steel. Facilities are provided for catalyst regeneration *in-situ*.

The catalytic reformer is designed to produce a full range reformate with a Research Octane Number of 100 clear. To do this, a hydrogen-to-hydrocarbon ratio of 10:1 is required, and a space velocity of 0.8. However, the unit can operate under less severe conditions. Facilities have been provided to inject water or organic chlorides into the feed to control catalyst activity.

The catalytic cracking unit serves two purposes: (1) to increase the yield of high octane gasoline at the expense of middle distillates, and (2) to reduce the pour point of the middle distillate pool. It is of the heat-balanced type, and has been designed for a volume conversion of 70%. Total feed to fresh feed ratio is 2.35:1. Catalyst circulation rate is about 1,000 ton/hr, and coke-burning capacity about 5 ton/hr.

The catalytic polymerization unit converts the unsaturates in the liquid C_3-C_4 stream into high octane gasoline. This stream is first amine treated to remove the bulk of the H_2S present. It is further treated with dilute caustic soda to remove traces of H_2S, with strong caustic soda to remove the mercaptans, and then is water washed. After treatment, the liquified gases pass through the poly unit, which contains five beds of catalyst in series.

Product blending and tankage. Three intermediate tanks only are provided. One has enough capacity to store nearly five days' supply of cat cracker feedstock. The second holds about 3½ days' supply of feed for the hydrotreater, its main function being to enable the crude unit and cracker to remain on stream while catalyst is regenerated in the hydrotreater and the catalytic reformer. The third holds sufficient desulfurized naphtha (1 day's supply at half throughput) to enable the reformer to be started up prior to the hydrotreater without risk of poisoning the catalyst with sulfur.

There is a blending manifold for premium gasoline, one for regular and one for middle distillates. Line blends can be made up from process unit components via a series of flow meters as they run down into component tankage. Blends can also be made up or corrected from the component tanks.

Considerable seasonal storage capacity is required in Montreal. Rather than having all this in finished products tankage, BP has provided one tank for each gasoline and each middle distillate component. This increases considerably the blending flexibility, particularly to meet seasonal variations in product quality. There is a total of about 325,000 bbl of tankage available for this purpose.

Finished product tankage amounts to 570,000 bbl, and another 400,000 bbl is to be constructed during this year. There is about 690,000 bbl of crude oil storage installed. Adjacent to the refinery site is a marketing terminal for road and rail loading, where six 10,000-bbl tanks are installed. This terminal is fed from the refinery tankage.

Crude supplies and product disposal: Crude oil can be brought into the refinery in two ways. Tankers can come up the St. Lawrence River and unload at BP's wharf, where booster pumps ensure high unloading rates. Alternatively, tankers can dock at Portland, Maine, from which point the crude comes via the Portland-Montreal Pipeline system to the refinery. BP has recently acquired an interest in this pipeline.

Products are shipped in one of three ways. Loading pumps in the refinery can load ships at the wharf via the 3½-mile pipelines. The same system is also used to fill the adjacent marketing terminal. Separate pumps for gasoline and middle distillates are used to transfer products into the Trans Northern pipeline system, the terminal of which is about a half mile from the refinery.

Utilities: Two Babcock and Wilcox boilers, each capable of generating 90,000 lbs/hr of steam at 650 psig and 800 F., provide the main source of steam for the refinery. The slurry boiler on the catalytic cracker can generate 30,000 lbs/hr of steam at 150 psig. Distribution is at 600 psig to the cat cracker blower and the reformer gas compressor. Other prime movers operate on steam at 150 psig. Heating steam is at 150 psig and 50 psig.

Electric power is obtained from Hydro-Quebec and there are two feeders, each of which can carry the full refinery load, with an automatic switching device which operates in the event of a failure of either feeder. The main supply is at 12,000 volts and this is broken down to 4,160 volts, 600 volts and 220/110 volts for distribution within the refinery. An emergency steam generator supplies power for instrumentation and also to an emergency lighting system.

Water pumped from the St. Lawrence River by two 2,000 (Imp.) gpm bore hole pumps supplies cooling water make up, fire water, and boiler feed water systems. Cooling water is circulated by three pumps (two steam driven). It returns to a 5-cell, induced draft, wooden cooling tower. The pumps take suction from the basin at the foot of the tower.

A buried fire main surrounds all principal areas of the refinery. System pressure is kept at 130 psig by pumps which take suction from a special tank of 500,000 gallons capacity. There are two fire pumps (one steam driven) each of 2,400 igpm capacity. Boiler feed water consists in part of returned condensate and in part of river water treated by a hot lime-zeolite process. Drinking water comes from the municipal supply.

Effluent water is segregated into several systems. One system normally contains clean water only, but nevertheless passes through one of the skimming ponds in the refinery area to prevent oil reaching the river. Water which may contain oil is first passed through a set of API separators where oil or sludge can be removed before

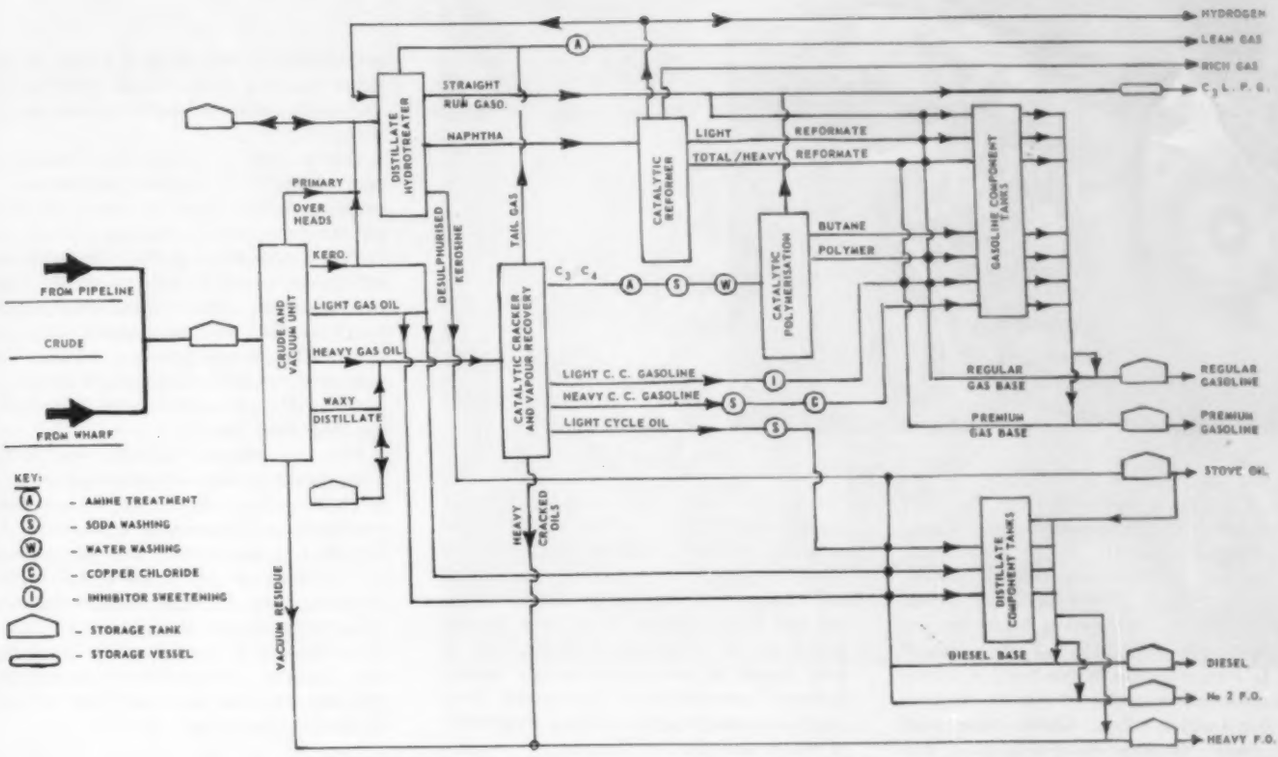


Fig. 1—Simplified schematic flow diagram of major processes at BP's new refinery.

discharging to the pond. Spent soda from the heavy cat cracked gasoline caustic wash is collected in a tank for sale to a local chemical company which recovers phenols.

All product tanks which contain light or crude oils have been designed to withstand 4 in. of water pressure and are fitted with pressure/vacuum vents which reduce the amount of light hydrocarbons lost to the atmosphere due to tank movements or "breathing".

Foul gases produced in the refinery are burnt in furnaces, e.g., vapor from the vacuum overhead system and from the caustic regenerator on the polymerization unit. Hydrogen sulfide removal was described earlier.

Stacks on all major furnaces including the boilers have been made sufficiently high to ensure that the gases from them are discharged to the atmosphere at sufficient elevation to allow them to disperse.

The refinery flare is elevated 150 ft above the surrounding ground and has been designed to burn with a smokeless flame. Safety valves which could pass H_2S are connected to the flare system.

At the entrance to the refinery, set back from the northern edge of the new Metropolitan Blvd., there is an air conditioned administration building which, apart from housing all office and some operational staff, contains the laboratory, canteen, telephone exchange and medical center.

A large aluminum sheeted building has been constructed for the stores and workshop area. Wash rooms and locker facilities for maintenance crews are incorporated.

The refinery employs about 200 persons. All but a handful of key staff, transferred from BP operations elsewhere for the first year or two, have been engaged in Canada. Refinery maintenance is being carried out under long term contract by a Montreal engineering firm.

Staffing the refinery has been the responsibility of the personnel manager, Albert A. Hoffman, a Montrealer who brought 22 years of Canadian refinery experience with him when he joined the company. Selection was difficult in view of the large number of experienced men who applied for the jobs at all levels. A large number of the applicants had previously worked for the company in Abadan and had emigrated to Canada following cessation of BP operations there in 1951. Experienced personnel

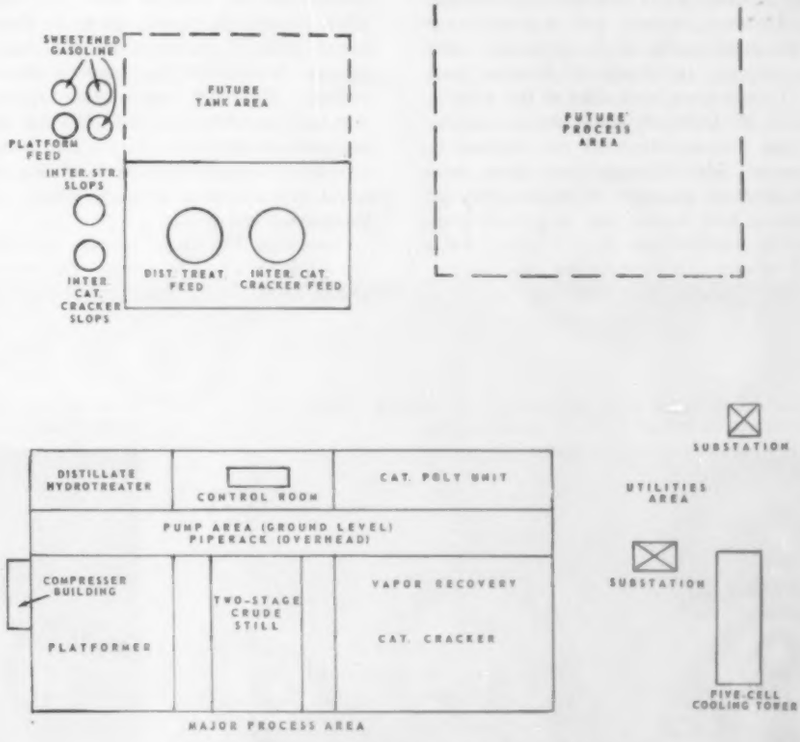


Fig. 2—Compactness and efficiency is emphasized in this plot plan of the new BP refinery at Montreal.

Part of a crowd of some 500 children being reached with traffic safety message by British Petroleum Canada's Mr. "Beep."

are being made available from other BP centers over the commissioning period on a temporary basis.

The vice president and general manager is J. MacWilliam, who was in the engineering department in London before coming to Montreal early in 1960. He replaced H. L. Ray, who was in this position during the construction stage, and who has returned to the London office. Construction work was under the supervision of a small staff of BP construction engineers, headed by C. H. E. Rebbeck.

The commissioning and operation of the refinery is the responsibility of J. B. Tod who was previously at the BP refinery in Kent, England in charge of commissioning a large expansion project. L. J. Campbell is accounting manager; A. Fewster is refinery engineer; J. W. Bushby is production control superintendent, and Dr. W. J. Darch is process superintendent.

BP worked closely with its prime contractor, Lummus, on both side of the Atlantic in the development of the Montreal building project. In charge of London work tor, Lummus, on both sides of the Atlantic tor, G. W. Gillespie, while project director for the firm in Montreal was Gordon C. Thomas. Mr. Gillespie has since been promoted to manager of engineering for Lummus Ltd. Under him as project manager in London was Robert Olley, while J. T. Sherry was construction manager under Mr. Thomas at the refinery.

Constant liaison was maintained between London and Montreal offices of Lummus by means of teletype communication.

At the peak period of construction during the summer of 1959, the construction crew reached 2,400, most of whom were directly employed by Lummus. The services of local specialists, sub-contractors and manufacturers were used to a large extent. Total investment was over $35 million, about 80% of which was spent in Canada.

The construction program carried out by Lummus and BP personnel was completed on schedule and the new refinery went on stream as planned on April 1. However, unusually severe winter weather, even for Canada, with more-than-normal snowfall and with lower-than-normal temperatures did not make the job an easy one.

For example, during the first winter of the almost two-year-long project, the first snow fell on November 21, 1958, and the ground was not clear of snow until April, 1959, virtually six months later. In December of 1958, 35 inches of snowfall was recorded. Normal for that month is about 23 inches. Minimum temperature recorded that same month was —16 F. Normal minimum temperature is +13 F. The number of sub-zero temperature working days that month was 11 out of 22 working days. The average is 5 out of 30.

Conditions like these actually prevented any work on a few occasions. During that winter, there were three days when the construction crew was sent home; it was either too cold or the winds were so high that work outdoors was completely impossible.

One method by which the construction crews defeated the weather problem was in covering skeleton type structures with huge polyethylene covers, and temporarily installing hot air blowers. In hydrostatic tests on various pieces of equipment, the engineers used an anti-freeze mixture of half water and half methanol instead of water only. The several pipelines between the plant and the river wharf have been buried with five feet of cover to keep them below the deep frost line.

The new refinery is really one of the more recent steps in a continuing story of BP in Canada, a story that started over three years ago, on February 8, 1957, when BP Canada Ltd. was formed. It might be said, in fact, that the story starts still earlier, sometime early in 1956 when a one-year marketing study was inaugurated by British Petroleum Co. from its London headquarters. This was a survey designed to meet the proposed expansion in Canada head-on and to discover what was to be done.

Once BP Canada Ltd. was established, actual marketing began. In May, 1957, the company bought 50 retail outlets and a large wholesale oil marketing firm, Lake St. John Distributing Co., in the Saguenay River Valley, at Chicoutini, Que. At the same time, BP built or acquired retail service stations in Montreal, Quebec City, and Sherbrooke.

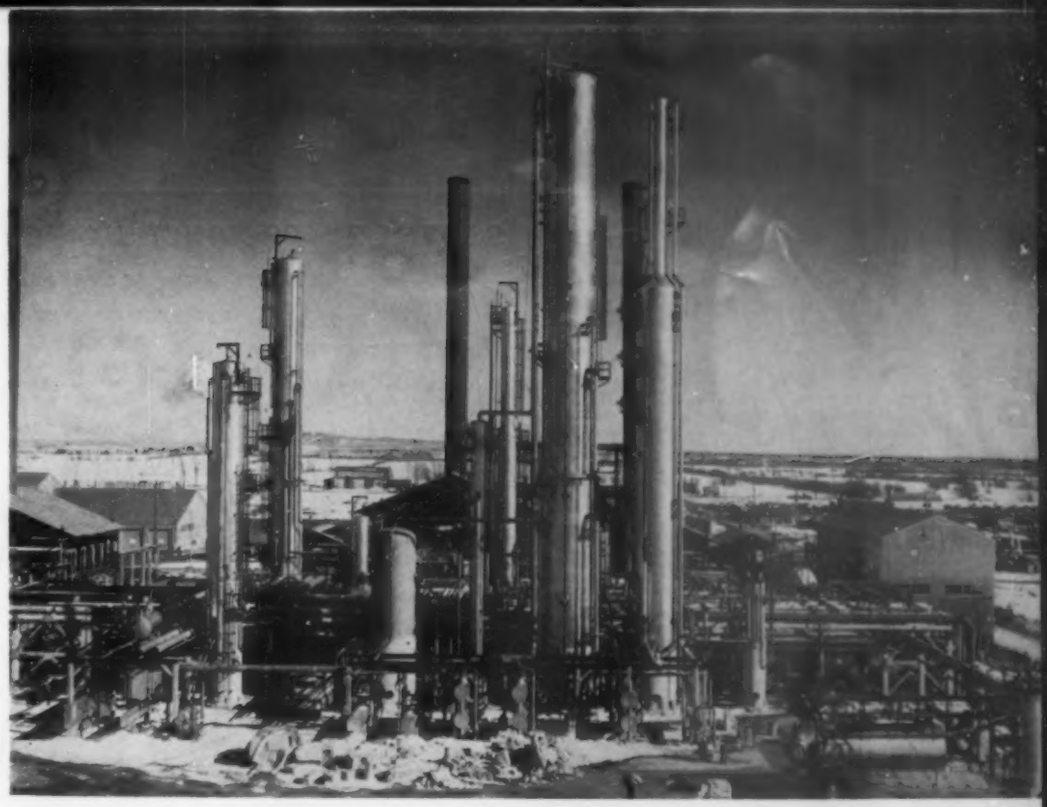
By August of 1957, BP had sold its first million gallons of gasoline in the Canadian market, and by the end of 1957 the company had a total of 100 retail outlets in the province of Quebec.

Early in 1958, the move began into Ontario, with purchase of Sunlight Oils Ltd. and Barrington Petroleum Products Ltd. BP had acquired six stations and built six more in Ottawa by that time. Simultaneously, stations began opening in Toronto, Kingston, Port Credit, Peterborough, Pembrooke.

Later in the spring of 1958, a move northward started, to the largest and best-known sales region in northern Ontario and

Unique service station design BP developed to resemble typical French-Canadian cottage in Quebec marketing area.

More conventional service station was standardized, but follows attractive and functional design.



General view of catalytic reforming and distillate hydrotreating units.

Quebec. In mid-June, BP bought P. M. Fleming Ltd., providing themselves with 120 retail stations, nine bulk plants in a 30,000 sq. mile area from Timmins in the west to Val d'Or in the east and from Cochrane in the north to Temagimi in the south.

During the summer of 1958, 32 stations were added in the area around Joliet, Que., and the company moved into the Gaspé Peninsula with the acquisition of Les Petroles du Golfe. By the end of 1958, the total number of stations stood at 350. A year later, last December, the total had reached 600, and it is expected by the end of this year it will be 800 stations.

In addition to the $35 million capital expenditure on the refinery, BP Canada will have invested some $35 million on exploration, and $30 million on marketing by the end of 1960. There are 450 employees at present, and the manufacturing affiliate, BP Refinery Canada Ltd. will have 200 at Ville d'Anjou when operations are in full swing later this year.

The company maintains district sales offices in eight locations: Montreal, Sherbrooke, Quebec City, Ottawa, Toronto, Kingston, North Bay, and the Laurentian Mountains, as well as bulk plants in all areas. There are marine terminals at Quebec City and Chicoutini.

Product merchandising has been distinguished in that BP has striven for uniqueness in station design so as to identify the product and the company. Most stations have a sweeping canopy. A color scheme with white predominant but carrying the symbolic yellow and green is used on stations and carried through in packaging and displays.

BP feels it is able to offer more to its lessees with its three-year contract (in contrast to the more usual 1- or 2-year contract). This requires a careful selection of lessees. The company always tries to secure local men. Training schools are operated in two districts. The training course won first prize in 1958 at the 6th annual contest of the National Visual Presentation Association meeting in New York.

The training program consists of two phases: (1) a five-day, full-time course at a centralized location, using conference techniques rather than lectures, and (2) on-the-job training. The more formal classroom studies includes orientation to British Petroleum, courses in station operation and general business information. The on-the-job course has the dealer trainee working under a field instructor. The company is presently developing a new program which will be started in the future.

One example of a method the alert BP marketing group used to bring the name of the company before the public was in a well-publicized and highly-praised safety campaign. Designed to appeal to school children and to their motoring parents this took concrete form in a talking auto, "Mr. BEEP," which was driven all over the area promoting safe driving and highway courtesy.

"Mr. BEEP" is a small car with an especially designed body making it look like a cartoon, and equipped with a public address system so it can deliver safety messages at special events, fairs, bazaars, service station openings, and public meetings of all types. The car was built to resemble the familiar whimsical car used as trademark in BP ads and billboards, and has contributed considerably to the impact of the company as a newcomer on the Canadian scene.

Another example of BP's merchandising was in the form of an unusually designed service station established in the foothills of the Laurentian Mountains some 35 miles north of Montreal. The station is a faithful replica of the original French-Canadian cottage—a design brought to Quebec from Normandy by the early settlers and subsequently adopted to the rigors of the Canadian winter. Seen from the front, it gives little ready indication of its purpose. Only the usual company sign, some distance from the building, serves to identify it. Even the service bay doors, normally a prominent feature of more conventional stations, are out of sight at the rear. The station was designed by Roland Beaudoin, an architect in BP's development department, in consultation with Wiggs Lawton & Walker, a Montreal firm of architects.

END.

Primary and vacuum distillation units with main, centralized control room in foreground.

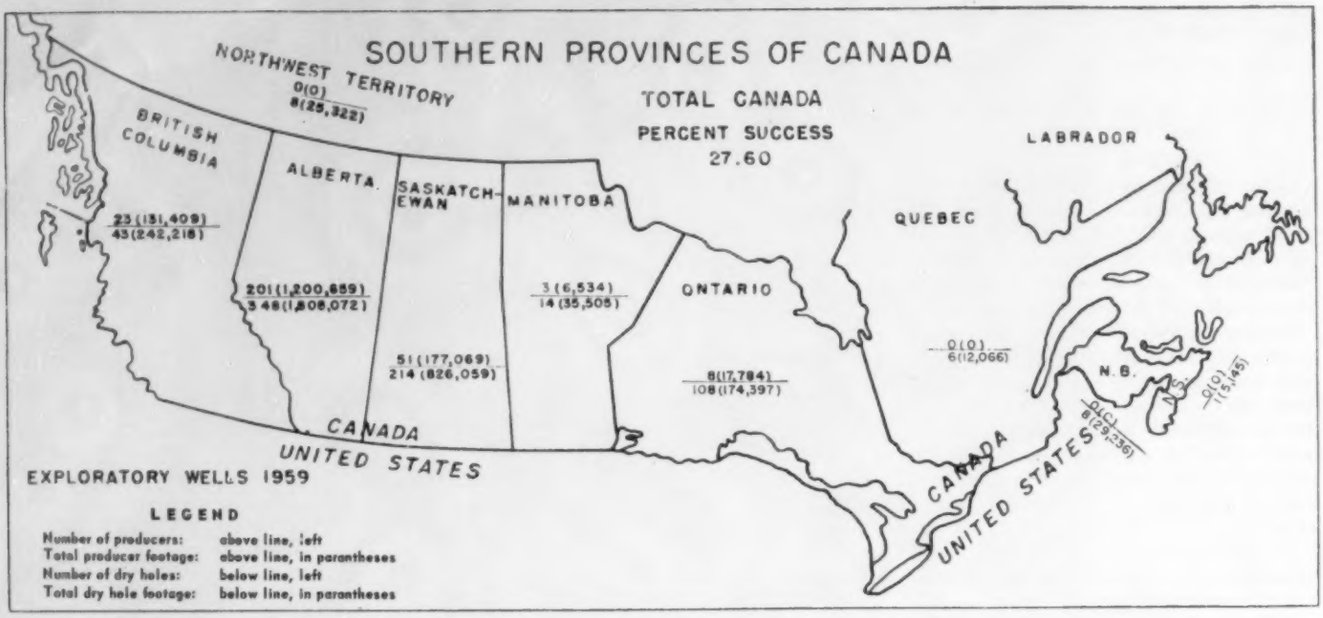


Fig. 1—Comparison of producers with dry holes in exploration in Canada during 1959.

Canada's exploration—1959

- Land play continues in north.
- Holdings rise 46.5%, with large jump in Arctic applications.
- Yukon has its first discovery. Other important finds in Alberta and northeastern British Columbia.
- Major development centers around Swan Hills.

OVERALL EXPLORATION AND DEVELOPMENT drilling activity in Canada remained relatively unchanged in volume during 1959. There was, however, a significant trend toward more northern geographical areas as the major fields of interest.

Reserves of liquid hydrocarbons increased by nearly 350 million bbl, about 9.5%, to 4 billion bbl, and gas showed a 14% rise. There were some 28 significant new wildcat discoveries, 11 of them relatively important, and three wildcat extensions. The Yukon had its first oil and gas discovery and other important finds were recorded in the Alberta's foothills, Alberta's northwest, and in northeastern British Columbia. Development drilling was mainly in the Pembina field of Alberta, the gas fields of southern Alberta, and oil fields in southeastern Saskatchewan. A major area of activity developed in the rapid exploitation of recent Beaverhill Lake discoveries in the Swan Hills region.

Table 1 summarizes exploratory activities in Canada during 1959. In Table 2 is a completion summary for Western Canada, and Table 3 gives a breakdown of development drilling in the west, by provinces. Canadian exploratory drilling is also shown in the map in Fig. 1 and its trend over the past decade or more is presented in Fig. 2.

In Western Canada in 1959 a total of 905 exploratory holes were completed, 278 producers and 627 dry holes. Producers included 136 oil wells and 142 gas wells. Total footage of 4,452,852 broke down to 1,515,676 ft in producers and 2,937,176 dry. This indicates 30.72% of the holes were successful and 34% of the exploratory footage was successful. The ratio of dry footage to producer footage was 1.93:1. For every producer completed, 2.25 dry holes were abandoned. Average depth of all exploratory holes was 4,930 ft.

Of the 661 new-field wildcats completed during 1959 in Western Canada, 144 were successful and 517 dry, a success rate on new-field wildcatting of 21.75%. One producer was drilled for every 3.59 dry holes.

In Eastern Canada, 131 exploratory holes were drilled for a total of 238,628 ft. Of these, 8 were successful, 3 oil and 5 gas. Footage for producers was 17,784 ft. Of the 131 holes, 6.11% were successful and 7.45% of the footage was successful. For every foot drilled in producers, 12.43 ft were dry. Average depth of hole was 1,823 ft.

Among Eastern Canada's 72 new-field wildcats in 1959, there were 3 successes and 69 dry holes, a success rate of 4.17%. One producer was drilled for every 23 dry holes.

The total of new-field wildcats for the entire country in 1959 was 733—147 successful and 696 dry holes, for a national success rate of 20.12%, or one producer for every 4.74 dry holes.

In Western Canada, the total wells drilled, 2,500, showed no essential change over the previous year, but the 905 explora-

tory tests accounted for a slightly greater proportion of the total, being up 6.2%. Exploratory drilling success rose from 24% to 31% and—for the first time—gas discoveries at 142 were ahead of the 136 oil discoveries.

The greatest increase in exploratory drilling was in British Columbia, up 40% over 1958. Alberta was up 6%, Saskatchewan up 2%, and the balance of western Canada remained about the same. Highest success rate was in Alberta, which reported 201 discoveries for an overall success rate of nearly 37%, which compares with 25% in 1958. Saskatchewan had 51 discoveries for a success rate of almost 19%, essentially the same as the previous year. Manitoba, with 3 discoveries, attained a rate of 18% as against 6% in 1958; and in B.C. a marked increase in gas discoveries brought total discoveries to 23 and gave a rate of 35%, considerably higher than the 21% in 1958. The one oil and gas discovery in the Yukon is not in the tabulations because the well is going to deeper horizons this year.

Western Canada's total exploratory footage rose 6%, about 254,000 ft. Average depth of holes drilled increased from 4,928 to 4,980 ft. The average depth per test was as follows: B.C., 5,660; Alberta, 5,480; Saskatchewan, 3,785; N.W.T., 3,165; and Manitoba, 2,475 ft.

Although total development drilling in Western Canada stayed at the previous year's level, there was a 63% drop in Manitoba, resulting from the lack of significant discoveries there over the past several years. Saskatchewan also decreased, though slightly, about 4%. Alberta, with 996 completions, increased 5%, and B.C. almost doubled its 1958 rate. This came about from exploitation of such previous discoveries as those in Boundary Lake, Milligan Creek, Beatton River, and Bubbles-Jedney.

TABLE 1—EXPLORATORY DRILLING IN CANADA, 1959

	Oil		Gas		Total Producers		Dry Holes		Grand Total	
Province	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage
Alberta	86	560,367	115*	640,292	201	1,200,659	348	1,808,072	549	3,008,731
Brit. Columbia	3	12,512	20	118,897	23	131,409	43	242,218	66	373,627
Manitoba	3	6,539	0	0	3	6,539	14	35,505	17	42,044
N.W. Territories	0	0	0	0	0	0	8	25,392	8	25,392
Saskatchewan	44	158,346	7	18,723	51	177,069	214	826,059	165	1,003,128
Total, West, Canada	136	737,764	142	777,912	278	1,515,676	627	2,937,176	905	4,452,852
Ontario	3	7,692	5	10,092	8	17,784	108	174,397	116	192,181
New Brunswick	0	0	0	0	0	0	8	29,236	8	29,236
Nova Scotia	0	0	0	0	0	0	1	5,145	1	5,145
Quebec	0	0	0	0	0	0	6	12,066	6	12,066
Total, East, Canada	3	7,692	5	10,092	8	17,784	123	220,844	131	238,628
Total Canada	139	745,456	147	788,004	286	1,533,460	750	3,158,020	1,036	4,691,480

* Includes four dual gas wells.

Source: Exploratory Drilling in 1959; B. W. Blanpied, Chairman, Committee on Statistics of Exploratory Drilling, American Association of Petroleum Geologists. The complete annual report by Mr. Blanpied will be published in the June, 1960, issue of the A.A.P.G. Bulletin.
These data published by permission of the A.A.P.G.

Surface mapping, done during the summer in Western Canada, has been rising steadily for a decade. The year 1959 brought a new high of 402 two-man party-months, about 30% above 1958. Most of the increase was due to greater activity in B.C. and the north. Mapping in B.C. doubled, reaching 150 party-months, and in the Yukon and N.W. Territories the increase was 38%, to 173 party-months. Almost half of the total for 1959 in Western Canada took place in the remote northern areas where it followed the recent large land acquisition. Mapping in the Arctic Islands, 16 party-months, included activity by industry for the first time. Previous work has been by the Geological Survey only.

Total land holdings reached a record high in 1959 of 366 million acres, an increase of 46.5% over the 250 million acres at the end of 1958. Two major factors contributed to this growth. One was a land play that started in the Arctic Islands in which private industry, chiefly the smaller independents, filed permit applications on close to 100 million acres, the majority of this in the Sverdrup Basin and Parry and Central Ellesmere Islands. The second factor was a heavy increase of some 25 million acres in the Yukon and N.W.T. There are still no Dominion regulations in effect for the Arctic Islands, consequently all holdings are still in the application phase.

Of the 905 exploratory tests drilled in 1959 in Western Canada, 160 were classed as discoveries (64 oil and 96 gas), and 118 were extensions to partly developed pools (72 oil and 46 gas). Table 4 lists the 28 significant new discoveries and three extensions.

Several of the more outstanding discoveries are discussed as follows:

The Yukon's first oil and gas discovery was in the Eagle Plains area at Western Minerals' Chance No. 1 (66°07'45" N, 137°31'45"W). Drilled 50 miles south of

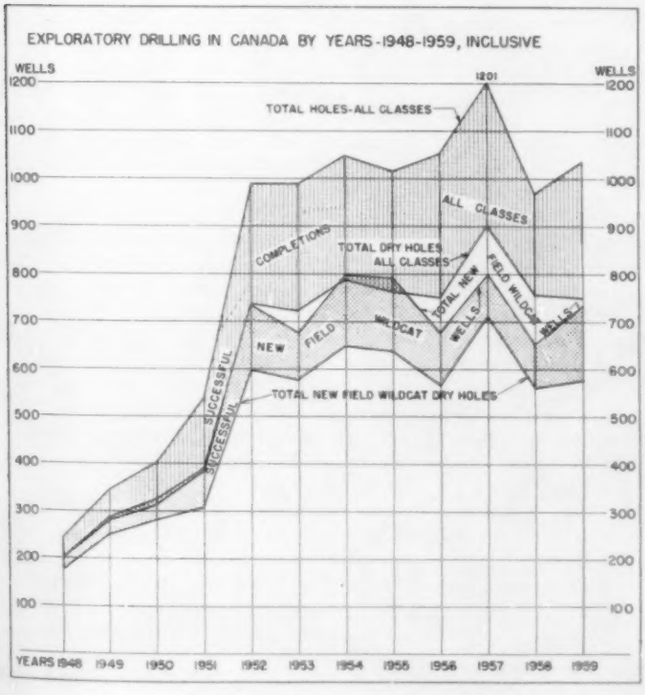
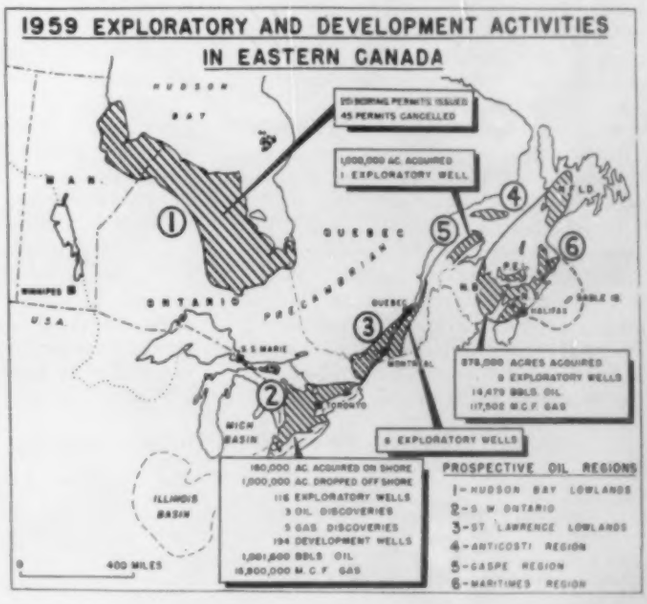


Fig. 2—(Left) Trends in exploration in Canada since 1948.

Fig. 3—Drilling activities in Eastern Canada in 1599.



A Shell Oil Nodwell Transporter operating over a muskeg trail in northern Alberta.

the Eagle Plains No. 1 deep abandonment, this well found light oil and gas in two separate horizons of the Permo-Pennsylvanian and the Mississippian at 4,230 and 5,190 ft respectively. Drill stem tests flowed gas at up to 10 mmcfd from both horizons, light oil at 56 bbl from the Permo-Pennsylvanian and over 13 bbl from the Mississippian. Situated 20 miles south of the Arctic Circle, it is the first discovery in the Territories since Norman Wells in 1921, 300 miles to the southeast. The test, on a gentle surface anticline further defined by seismic work, was suspended at the end of 1959 and is now drilling to deeper horizons.

British Columbia had three important gas discoveries, two in the Devonian and one in the Mississippian.

In the relatively unexplored region of the northeasterly part of the province, Gulf States' Kotcho Lake c-67-K/94-I-14 flowed at rates up to 5.5 mmcf/d from 75 ft of gross pay (40 ft net), and Gulf States, Petitot d-24-D/94-P-13 flowed at rates up to 6.5 mmcf/d from 126 ft of net pay, at depths around 6,600 ft. The wells, about 60 miles apart, discovered two separate major gas reservoirs in Middle Devonian, Slave Point reefal carbonates.

A Mississippian (Upper Debolt) gas discovery, which may be of major significance, was made 21 miles west of the Jedney, Triassic gas field. The discovery well, Sinclair et al., Lily d-12-K/94-G-2, found 75 ft of net pay and was completed with a potential of 24 mmcf/d at 7,900 ft. The Mississippian discovery is in a largely undrilled area of the Rocky Mountains northern foothills.

A total of 17 oil producers were completed, mostly in the Boundary Lake, Milligan Creek, Beatton River area. Exploitation for gas resulted in 12 gas producers along the Bubbles, Jedney, Laprise trend and 9 gas wells scattered among six other fields.

In southwestern Alberta, 6 miles south of Pincher Creek, a major Mississippian wet gas discovery was made at 14,100 ft. British American's Lookout Butte 11-31-1-28 (W4M) was completed with an open flow potential of 31 mmcf/d, with a condensate (52° API) rate of 100 bbl/mmcf. Production tests from 300 ft of selectively perforated intervals flowed at sustained rates as high as 18.6 mmcfd through tubing. This was the first test of a foothills structure lying on trend from, and between, the Waterton and Pincher Creek gas fields.

Another significant Mississippian wet gas discovery was made 180 miles further north, in the Burnt Timber region, also in the Alberta foothills. This well, Shell's Burnt Timber 6-22-31-9 (W5M) flowed wet gas at rates up to 9 mmcfd from perforated intervals 11,155-11,353 ft, with condensate at 4 bbl/mmcf.

The Swan Hills-Virginia Hills-Whitecourt area, about 120 miles northwest of Edmonton, continued to provide interesting discoveries and extensions. Development in Swan Hills, during 1958 and 1959 has resulted in a total of some 83 wells being completed in the field, with a producing area of about 50,000 acres and ultimate recoverable reserves approaching 500 million bbl. Net pay sections at depth of approximately 8,000 ft, average 114 ft, varying from 11-200 ft.

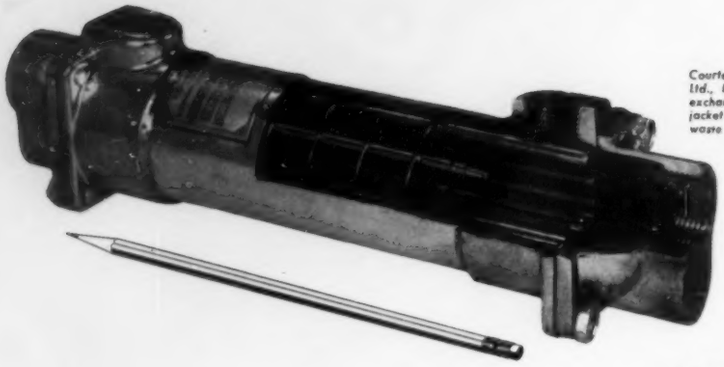
Six miles south of the Swan Hills field, a significant Beaverhill Lake reef discovery was made in the Sarah Lake area in March 1959. The discovery, British American-Pan American, Sarah Lake 2-13-65-11 (W5M) was completed at 8,140 ft with an initial potential of 990 b/d from 55 ft net oil pay. Development drilling around the

TABLE 2—COMPLETIONS, WESTERN CANADA, 1959

	Oil	Gas	Dry[1]	Totals	% Successful
Exploratory tests	136	142	627	905	30.7
Development wells	1,246	157	182	1,585	88.6
Totals	1,382	299	792[2]	2,473	68.0

[1] Includes wells drilled for oil or gas but completed as service wells.
[2] Actual totals—17 holes, which are both Deeper-Pool tests and development wells, have been counted once only.

IN CANADA: G. DIKKERS OF CANADA LIMITED, SCARBOROUGH, ONTARIO



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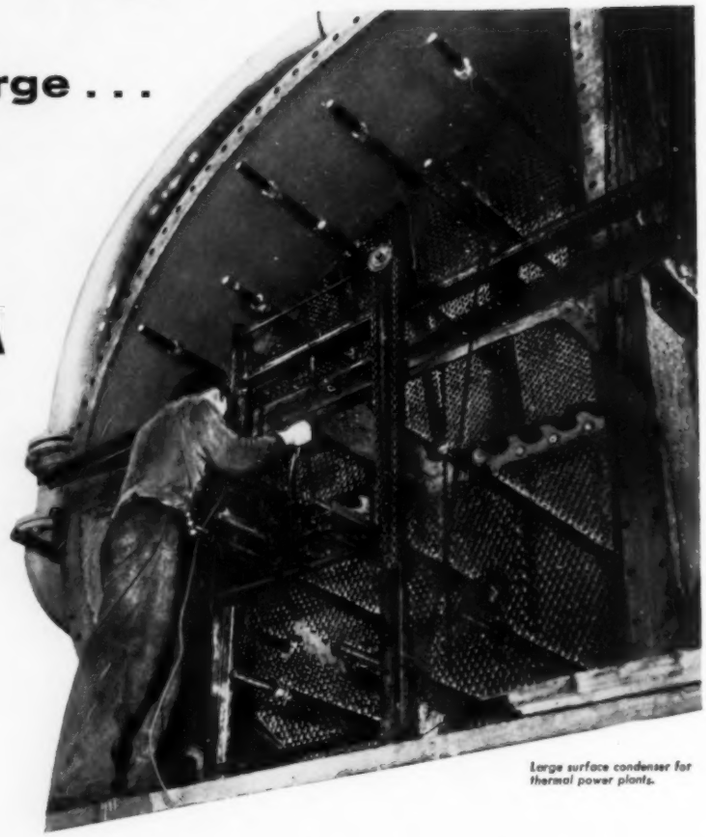

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Surveyors locating the site for a Shell Oil well in the southern Alberta foothills.

discovery has resulted in five completed oil wells.

A second discovery by the same team in November, Cora 2-1-66-11 (W5M), midway between Swan Hills and Sarah Lake, indicated the possibility of continuous production between the two fields.

Five miles south of Sarah Lake, Imperial discovered a Beaverhill Lake reef oil field in May 1959, in the Judy Creek area. The discovery, Judy Creek 16-31-63-10 (W5M) was completed from 61 ft of net pay at 8,320 ft with an IP of 930 b/d. Twelve wells have been completed in the field area (net pays in the 70-ft range), with the recoverable reserves in the order of 30 million bbl.

Six miles southwest of the Judy Creek field, Imperial made another Beaverhill Lake reef discovery in September at Virginia Hills 10-13-63-12 (W5W), widening the prospective area of the Beaverhill Lake reef buildup to the west.

In the northern part of the Swan Hills area, Beaverhill Lake discoveries by Texaco and Canadian Kewanee opened up the possibility of further development. Texcan, Deer Mountain 2-7-69-8 (W5W), 8 miles northeast of Swan Hills, was completed in February from 45 ft of net pay at 7,240 ft, with an I.P. of 350 b/d, and Kewanee, Inverness 4-7-69-10 (W5M), 7 miles northwest of the field discovered Beaverhill Lake reef oil in November, at a depth of about 7,900 ft.

Fifteen miles west of the Swan Hills-Judy Creek development, a discovery by Shell in January 1959 at South Virginia Hills 6-34-64-13 (W5M), pointed to a possible 4-mile southeasterly extension of the Virginia Hills field. The well was completed with an I.P. of about 1,000 b/d at 9,342 ft from a net 25 ft of pay. The Virginia Hills field had three completed oil wells at year-end with an average of 48 ft of net pay. Development drilling 3 miles southeast of the field, saw three additional wells completed.

A wet gas discovery on the Peace River Fringing Reef in northwest Alberta was made at Shell's Worsley 14-19-87-7 (W6M), in September 1959. The well flowed at restricted rates up to 11 mmcfd with condensate rate of 15 bbl/mmcf from a depth of 7,235 ft in the Upper Devonian Woodbend reef. This was the first substantial recovery of hydrocarbons from the reef on the north side of the Peace River High.

Field development drilling in Alberta increased by 5% during 1959 when 996 holes were drilled for oil or gas, as compared with 950 during 1958. The number of oil producers was down from 812 to 770 and amounted to 85% of all successful completions. Drilling in gas fields added 131 new gas wells, up from 84 during 1958, and amounted to 15% of all the successful completions. Dry holes also increased, lowering the overall success rate from 94 to 90%.

Cardium fields in the Pembina area, where half of the new oil wells were completed, continued the major oil development area. The Swan Hills Beaverhill Lake fields became the second most active area, accounting for 18% of the new oil wells. The remainder were drilled in numerous fields in the southern part of the province, where three-quarters of the gas development drilling took place.

Thirty-five service wells were drilled, mostly for secondary recovery projects in the Pembina field.

There were no outstanding discoveries in Saskatchewan and Manitoba during 1959, other than the finding of helium gas in the Success area of southwestern Saskatchewan at British American's Wilhelm 1-9-17-14 (W3M). This well flowed inert gas from a 47-ft interval in the Cambrian at a depth of 6,550 ft, at rates up to 5.5 mmcf/d with a helium content of 1-2%. Six companies have made agreements with the government for helium exploration, covering an area of about ¾ million acres

TALBE 3—DEVELOPMENT DRILLING, WESTERN CANADA, 1958-59

Province	1958	1959	% change
Alberta	950	996	Up 5
British Columbia	27	49	Up 80
Manitobe	76	28	Down 63
Saskatchewan	532	512	Down 4
Totals	1,585	1,585	

TABLE 4—IMPORTANT DISCOVERIES IN WESTERN CANADA, 1959

Operator	Well Name	Location	Comp. Date	Total Depth (Ft.)	Prod. Depth (Ft.)	Initial Potential	Gravity of oil (API)	Production Formation
YUKON								
Western Minerals	Chance	66° 7'45" N 137° 31'45" W	—	Susp. at 5,280	4,230	10 mmcfd on DST and OTS	Light oil	Permo-Penn. (Gas and Oil)
					5,190	10 mmcfd on DST and 13 bbls. oil	Light oil	Miss. (Oil and Gas)
BRITISH COLUMBIA								
Sinclair-Pacific	Peejay	d-39-E/94-A-16	15/3	3,910	3,840	150 b/d	39°	Halfway (Tri.)
Texaco-N.F.A.	Cameron River	d-43-H/94-B-10	28/12	9,472	8,185	0.5 mmcfd	—	Permo-Penn.
Pacific-Sunray-Imperial	Bubbles	b-33-I/94-G-1	22/4	5,578	4,886	11.7 mmcfd	—	Baldonnel (Tri.)
Sinclair-Atlantic-Calvan	Lily	d-12-K/94-G-2	19/4	8,691	7,918	AOF 24 mmcfd from 2 zones	—	Debolt (Miss.)
Triad	Beatton River	d-39-K/94-H-2	7/1	3,791	3,351	130 b/d	43°	Bluesky (L. Cret.)
Gulf States	Kotcho Lake	c-67-K/94-I-14	27/2	6,702	6,635	5.5 mmcfd	—	Slave Point (M. Dev.)
Gulf States	Petitot River	d-24-D/94-P-13	13/3	6,680	6,520	6.5 mmcfd	—	Slave Point (M. Dev.)
ALBERTA								
B.A.	Lookout Butte	11-31-1-28 W4	16/12	12,648	12,104	18.6 mmcfd and cond. at 100 bbls mm	—	Turner Valley (Miss.)
Shell	Carbondale	6-12-6-3 W5	11/1	14,027	13,525	Max. flow 16 mmcfd	—	Wabamun (U. Dev.)
Cree-CEGO	Carstairs	6-2-30-3 W5	27/11	8,632	6,631	320 b/d	34°	Cardium (U. Cret.)
Can. Sup.	Westcott	8-31-30-3 W5	30/1	8,916	7,029	160 BOPD	38°	Cardium (U. Cret.)
Shell	Burnt Timber	6-22-31-9 W5	19/12	13,890	11,155	AOF 9 mmcfd and cond. at 4 bbls/mm	—	Miss.
Altana	Sundre	6-29-34-5 W5	18/9	9,443	9,026	5 mmcfd on DST	—	Basal Quartz (L. Cret.)
White Rose Supertest	Buck Lake	6-20-45-5 W5	16/8	7,138	6,940	4.6 mmcfd on DST	—	Miss.
Imperial	Brazeau River	6-11-45-13 W5	25/10	13,450	9,853	2.8 mmcfd on DST	—	Miss.
Lobitos	Bigoray	10-22-51-8 W5	20/8	6,150	5,890	2,000 b/d	33°	Basal Bl. (L. Cret.)
Imperial	Judy Creek	16-31-63-10 W5	9/5	9,490	8,320	930 b/d	43°	B.H.L. (M. Dev.)
Shell	Simonette	10-1-63-26 W5	21/3	11,756	11,575	930 b/d	50°	Leduc (U. Dev.)
Shell	S. Virginia Hills	6-34-64-13 W5	21/1	9,820	9,342	1,020 b/d	36°	B.H.L. (M. Dev.)
B.A. Pan Am.	Sarah Lake	2-13-65-11 W5	25/3	8,470	8,140	990 b/d	40°	B.H.L. (M. Dev.)
B.A. Pan Am.	Cora Swan Hills	2-1-66-11 W5	2/11	8,864	—	—*	—	B.H.L. (M. Dev.)
Texcan	Deer Mtn.	2-7-69-8 W5	25/2	7,319	7,240	350 b/d	41°	B.H.L. (M. Dev.)
Kewanee	Inverness	4-7-69-10 W5	10/11	7,966	—	—*	Light oil	B.H.L. (M. Dev.)
Sohio-Sinclair	LaGlace	10-11-74-8 W6	18/7	7,957	6,302	130 b/d	36°	Halfway (Tri.)
Hudson-Bay-Union	Eaglesham	10-14-77-25 W5	24/2	8,294	7,552	170 b/d	38°	Leduc (U. Dev.)
Shell	Worsley	14-19-87-7 W6	7/9	7,581	7,235	11 mmcfd and cond. at 15 bbls/mm	—	Leduc (U. Dev.)
Honolulu-et al	Bison	10-12-95-15 W5	15/3	5,411	4,738	Flowed up to 12 mmcfd	—	Gilwood (M. Dev.)
SASKATCHEWAN								
Champlin	Elmore	1-6-2-32 W1	30/8	4,135	4,006	120 b/d	39°	Midale (Miss.)
F.P.C.-Shell	Hoffer	1-28-2-14 W2	27/3	6,100	5,869	100 b/d	34°	Midale (Miss.)
Sarcee-Canpet-et al	Eagle Lake	10-4-31-21 W3	10/5	2,245	2,218	Pumped 35 b/d	36°	Viking

* No information.

TABLE 5—SIGNIFICANT DISCOVERIES, EASTERN CANADA, 1959

Operator	Well Name	Location	Compl. Date	Total Depth (ft)	Initial Production	Producing Formation	Deepest Formation Tested	Field or Pool
Imperial Oil	P. Wright #1	Colchester S. Twp. Essex	June 8	2497	65 Bbl.	Trenton (Ord.)	Black River	Colchester
C. B. Lewis	J. Tarr #1	Aldborough Twp. Elgin County	Nov. 21	3948	572 mcf.	Trempeleau (U. Camb.)	Tremp. (U. Camb.)	New Glasgow
T. Seynuck	Hornby #1	Trafalgar Twp. Halton County	Nov. 17	1705	150 mcf.	Black River (Ord.)	Precambrian	Hornby

from the Success area to the United States border.

Development acitvity declined slightly (4%) in Saskatchewan and strongly (65%) in Manitoba. Most of the wells (87%), were again drilled in the southeastern fields for production from the Charles or Mission Canyon formations, where the success rate remained constant at 88%. Development activity in the western part of Saskatchewan centered in the Dodsland field, which was expanded by 33 new producers.

In Eastern Canada, exploratory drilling increased—noticeably in the Maritimes—but development activity decreased. Offshore drilling in Southwestern Ontario (exploratory and development combined) rose 39%. There were three significant discoveries, one each in Essex, Elgin, and Halton Counties (see Table 5).

Perhaps the most interesting feature of exploration in the Atlantic Provinces was in acreage acquisition by some major companies. Approximately 1 million acres were taken up in Central Gaspé and 600,000 offshore from Nova Scotia around Sable Island. Imperial, B-A, Mobil, and Cal Standard are now represented by fairly substantial land holdings throughout the region.

Total acreage now held in Quebec and the Atlantic Provinces stands at 16.5 million acres.

Athabasca Tar Sands: During 1959, interest was revived in Alberta's outcropping McMurray tar sand deposits (which contain an estimated 300 billion bbl of heavy (7.5° API) oil), by the initiation of two new experimental projects. The first, now being operated by City Services Athabasca Inc., is an extensive strip mining and separation operation making use of a rotary digging machine, a mobile extraction unit, and a pilot refinery. This plant is working at the Athabasca River outcrops where about 5 billion bbl are available at the surface.

Preparatory work was also completed by Richfield Oil Co. to investigate the releasing of liquid hydrocarbons from the sands by an underground nuclear explosion. A nine-kiloton explosive was planned to be detonated at about 1,200 ft depth in the Devonian Beaverhill Lake limestone, about 20 ft below the oil sands. It was hoped that the heat released from the explosion would raise the temperature of a large volume of oil to about 100 C, at which the viscosity would be sufficiently reduced to render it producible by normal field methods. This project is now pending governmental agreement on the peaceful uses of nuclear energy.

ACKNOWLEDGMENT

The preceding article is based on information and statistical data prepared by the American Association of Petroleum Geologists, and provided through the cooperation of several members of the A.A.P.G. Committee on Statistics, including B. W. Blanpied, Gulf Oil Corp.; T. J. Latus, Shell Oil Co. of Canada Ltd.; and W. A. Rolliff, Imperial Oil Ltd. END.

NATURE'S CATALYSTS (7)

For Fine Leather Use Dung

Many centuries ago, tanners learned that an aqueous infusion of fowl or dog manure, applied before tanning to a swollen skin fresh from the lime pits, gave the finished leather a smoothness and silkiness of grain that could be obtained in no other way.

Bating, as this weird treatment was called, depended on dung until some 40 years ago, when research showed that enzymes in the dung were the operative catalytic agents, and to avoid the variable results so often obtained, pure synthetic bates were produced.

Quality control of ingredients has always been used in the manufacture of I.C.I. catalysts, and tests are carried out at every stage to ensure a reproducible high-quality product. Throughout the world, I.C.I. catalysts play a vital part in heavy chemical, petroleum chemical, and petroleum refining industries.

Full information on I.C.I. CATALYSTS is available on request.

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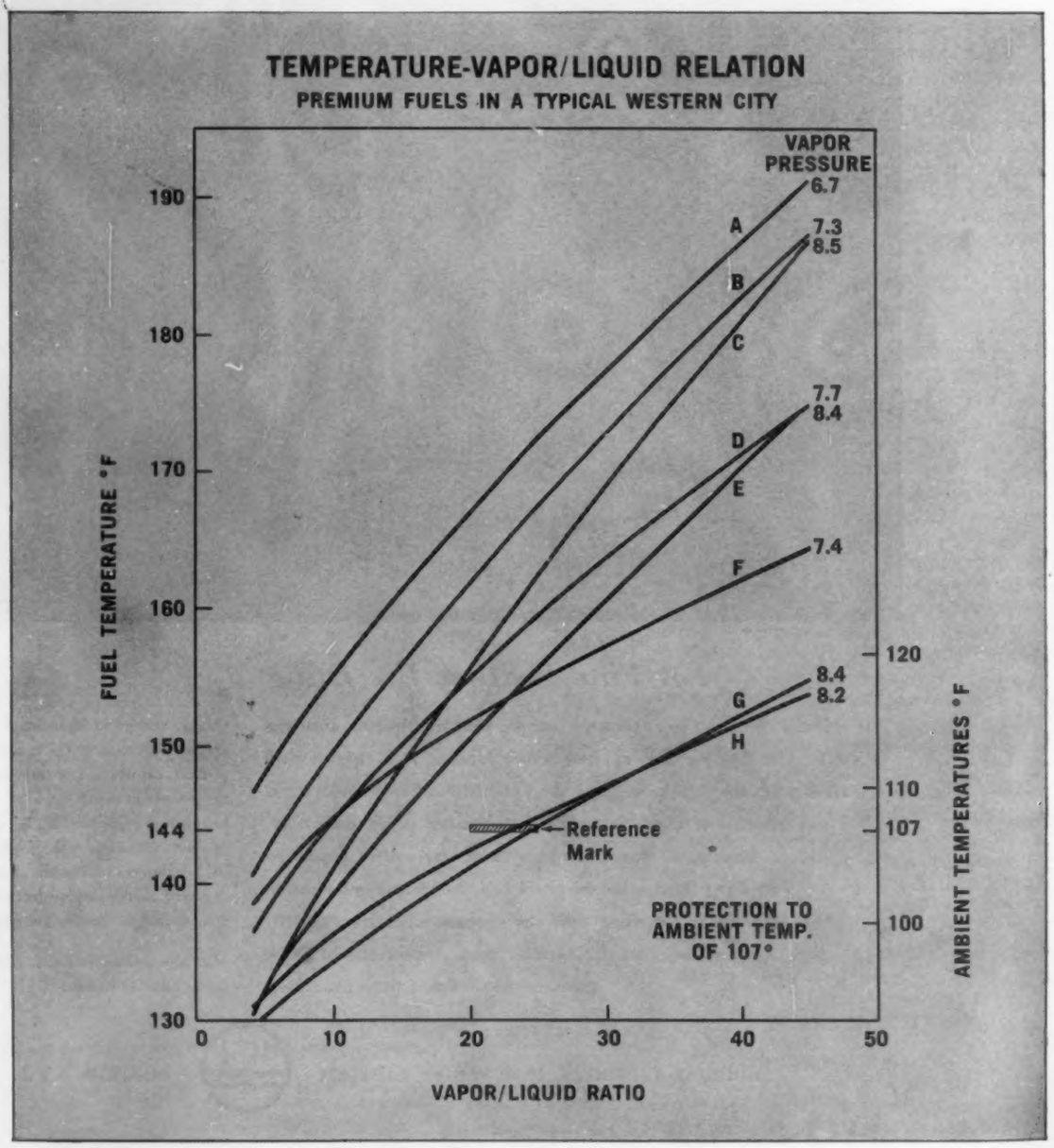
8276

Here's a practical method for analyzing Front-End Volatility

Ethyl Research uses temperature-vapor liquid ratio curves to study relative and absolute front-end characteristics of gasoline

by **GILBERT WAY** — *Research Representative*



The above curves were calculated by the CRC method using Ethyl Volatility Survey data.

WHERE TO SET front-end volatility for optimum balance of economic and automotive benefits is an important question for refiners.

One result of Ethyl's work in this field is a routine approach to interpretation and comparison of seasonal volatility data. The method can be used to establish or review volatility requirements at both the refinery and marketing levels. Data from the Ethyl Volatility Survey are used as the basis for temperature-V/L studies. *Refiners may have analyses of their own marketing areas upon request!*

Method is Simple; Easy to Understand

Temperature-V/L ratio curves—widely accepted as a graphic representation of how gasoline vaporizes in a fuel system—are used to show the volumes of vapor formed per volume of liquid at any given gasoline temperature. (Curves were calculated by the CRC method.)

In addition to showing relative vaporizing tendencies among various fuels, the curves may be related to reference points that indicate average conditions of fuel temperature and limiting V/L in automotive fuel systems. In the accompanying graph, average conditions for premium fuels are shown by the reference mark ranging from 20 to 25 V/L at a fuel temperature of 144°F.

This reference mark range was established from the results of extensive road tests conducted in recent years. Many factors were considered in arriving at this practical bench mark, such as severity of test conditions, age and condition of fuel system components, and variation of individual cars from average characteristics.

In theory, a fuel having a curve which passes through the reference mark would represent highest desirable use of front-end "fill." Those above the mark would be more conservative and those below subject to vapor lock.

The estimate of fuel temperature was established by adding the temperature rise at the fuel pump under severe vapor locking conditions and the ambient temperature to which protection against vapor lock is desired. Experience has shown that this fuel temperature rise at the pump averages 37°F. In the marketing area represented in the graph, protection is desired up to 107°F.

Some Interesting Observations on Volatility

The figure shows a wide variation in vaporizing tendency of fuels. Fuels A, B and C indicate a conservative position. This is contrasted by high volatility and border line protection against vapor lock by curves of fuels G and H.

Curves having steep slopes are typical of fuels pressurized by butane. Those with flat slopes indicate a high pentane content. Fuels C, E and G have essentially the same Rvp of 8.4 to 8.5. They converge at a V/L of 4, the V/L of the Reid vapor pressure bomb.

A V/L of 25, however, is reached by fuel G at a fuel temperature of 144°F., whereas fuel C must reach 163°F. before evolving the same quantity of vapor. Thus fuel C offers more protection against vapor lock than fuel G when abnormally high temperatures are encountered. This illustrates that, *for a given Rvp, butanized* fuels offer greater vapor lock protection in motor vehicles than fuels that are pressurized largely by pentane. Another way of comparing these two fuels is at constant temperature: at 150°F., fuel G has 35 V/L, fuel C only 16.

How Ethyl Research can help you

In addition to participating in Oil Industry cooperative studies, Ethyl Research has worked with many individual oil companies in studies of vapor locking tendencies of fuels and engines.

The experience gained in these programs provides a broad understanding of the problems associated with front-end volatility.

Our engineers are prepared to bring you analyses of Temperature-V/L characteristics of fuels from marketing areas of your choice, based on Ethyl Volatility Survey data. For overseas areas where Survey data are not available, studies can be made for refiners who supply sample inspection information.

If you would like this service, or more information about it, just contact your Ethyl Representative. He'll be glad to make arrangements.

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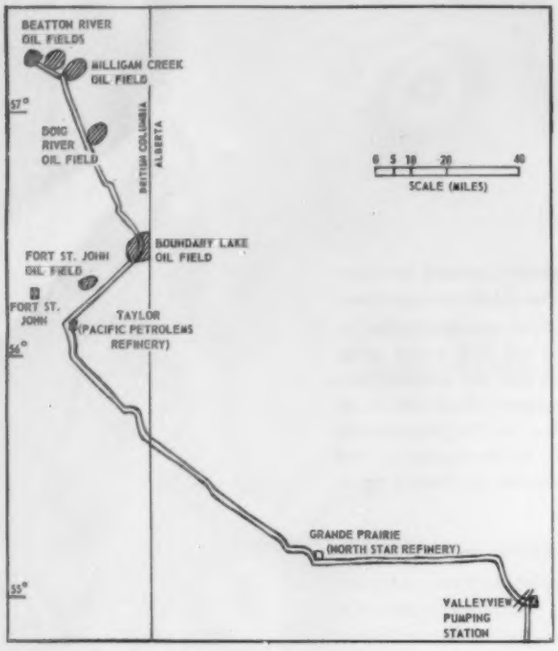

Proposed new pipeline to stimulate British Columbia crude search

Left: Peace River Oil Pipe Line (B. C.) Ltd. proposed pipeline for the northeastern British Columbia oil fields, authorized by B. C. government.

Crude oil in British Columbia is facing its first period of real expansion in 1960. Relatively dormant since the first oil discovery in 1955 because of the lack of transportation facilities, B.C. oil has been virtually assured of a pipeline outlet by the end of the year. The proposed pipeline, which has received approval in the form of a construction permit from the provincial government, will provide an initial throughput capacity of about 25,000 b/d. Current production, about 3,000 b/d, is being trucked to the two small refineries in northeastern B.C. for local consumption.

All the oil so far discovered in British Columbia has been found in the northeastern corner of the province where all the natural gas reserves have been found. This region, northeast of the Rocky Mountains, is an extension of the interior plains of Alberta and the northern foothills belt. The sedimentary structures which occur in the region are similar in origin to those of Alberta. The sedimentary column is thicker than in any other part of the province, and thicker than in most parts of Alberta.

There is wide variation in the stratigraphic sequence and facies between areas. The whole region has been influenced materially by mountain-building. Thus basement trends and warping of the earth's crust have had extensive effects on structure and sedimentation. There is a general thickening of formations to the southwest, and a thinning to the northwest due to erosional truncation. There is a great number of producing and prospective formations in the B.C. sedimentary region, but the Triassic is by far the most prolific for oil accumulation. Of the 60 million bbl estimated reserves in the province, about 50 million are Triassic and nearly all the rest are Mississippian.

First oil discovery in B.C. was made in gas drilling in the Fort St. John field in 1952, and it was not until 1956 that the well was recompleted for oil and development was started in the oil zone.

Oil was discovered at West Buick Creek in 1954, on the east flank of the gas-bearing anticline. The most productive discovery to date occurred at Boundary Lake in February 1955, when a well drilled by Texaco Exploration Co. and the Northern Foothills Agreement Group (Texaco, Shell Oil Co., Mobil Oil and British American) found 60 ft of net Triassic pay. Boundary Lake is a large stratigraphic trap, mostly in B.C. but apparently extending into Alberta (from which fact its name was derived). The dolomitic limestone bed is an extensive stratigraphic unit which is recognizable over an area of about 800 square miles around the field. It is overlain by red siltstone and underlain by a massive 40-ft anhydrite bed. The dolomitic limestone is replaced laterally by overlying siltstone. This pinchout condition forms the stratigraphic trap which contains the oil.

There is evidence of a strong structural nosing in the northwestern part of the Boundary Lake field. Local closure forms an anticline with a trend from southwest to northeast. There is a further gentle nosing in the southeastern sector of the field. One interpretation of underlying structure is that the moderate Triassic structure overlies Paleozoic structures which are more extreme, and that the latter possibly reflect draping over deeper Paleozoic fault scarps.

The Milligan Creek field, rated as next in importance to Boundary Lake, was discovered in 1957 by a joint wildcat of Hudson's Bay Oil and Gas Co. Ltd. and Union Oil Co. of California. Also a Triassic formation field, Milligan is primarily a stratigraphic trap. It consists of a nearshore marine sand bar oil deposit. An updip pinchout of the bar type deposit forms the trap condition. There is little structural relief. Reversal is indicated on the top of the pay zone but is attributed to rapid updip thinning of the sand body.

The Beatton River field, adjacent to and northwest of Milligan Creek, was discovered in 1959. Although evidently related closely to Milligan, it is a separate structure cut off by two dry holes between the two fields. Discovered by Triad Oil Co. Ltd., it is another Triassic field, with the oil/water interface calculated as 40 ft. higher than in the Milligan field. The geology is comparable, disclosing the same regional pinchout of the productive sand, forming the trap condition. There is a pronounced nosing, which has been mapped on top of the pay zone. Local sedimentation has deposited a shaly facies between the two fields and this has formed an apparent permeability barrier. This indication appears to be confirmed by the completion of the two dry holes in this intervening space.

Later in 1959 a second Beatton River field, designated as Beatton River West, was discovered immediately west. Development has not proceeded far enough to indicate whether there is a connection between these two pools, or whether another permeability barrier may exist. The West Beatton pool appears, from preliminary geological data, to be primarily a stratigraphic trap in an area of extremely low regional structural relief. This interpretation is derived from structure mapped in the Lower Cretaceous sand. The oil accumulation has been identified as in the Lower Cretaceous, Bluesky sandstone, and the sand appears to be somewhat argillaceous.

The latest field discovery was made at Doig River in the late winter of 1959 by

Sinclair Canada Oil Co. and Pacific Petroleums Ltd., in the Triassic formation, and the structure is reported as generally very similar to that of the Milligan Creek field, which lies 15 miles north. The Triassic exhibits excellent porosity and permeability, but pinches out completely in the updip direction to the northeast. Interpretation of the immediate vicinity of the field is that many separate elongated sand bars are likely present beyond the edge of the main sand pinchout. Because of this, and because of the long extent of the northwest-southeast trending line of strike, it is predicted that many more fields, similar to the Milligan and Beatton fields, will be found in the intermediate area around the Doig River field.

All the B.C. oil is light gravity. Boundary Lake is 35° API and the other fields are all between 38 and 40° API.

Reserve estimates made last summer by McDaniel Consultants Ltd., comprising both proven and probable, indicated a total reserve of 134,737,000 bbl. This was made up of 62,823,000 bbl proven and 71,914,000 bbl probable. Cumulative production to the end of 1959 was less than 2 million bbl and 1960 production will barely reach 1 million bbl, because the pipeline will not be completed until late in the year. Extensions since the reserve report was compiled have added to the probable total, and it is expected that the incentive provided by the pipeline outlet will lead to further discoveries.

The Boundary Lake field, by far the largest in the province, has an estimated reserve of 77,880,000 bbl of original oil in place, proven and probable. The primary mechanism is a solution gas drive, but to a lesser extent there is also an expanding gas cap drive. The primary recovery factor is estimated as 21.3%. Milligan Creek, next largest field, has an estimated oil in place reserve of 30,631,000 bbl, with a 35% recovery factor. The Beatton River combined fields are calculated as 9,100,000 bbl, while Doig River is given a preliminary figure of 2,053,000 bbl. The Fort St. John reserve is only 738,000 bbl.

Development drilling up to the end of 1959 had increased the number of producing oil wells in B.C. to the following: Boundary Lake 22; Milligan Creek 9; Beatton River and Beatton River West 7; Fort St. John 4; and Doig River 3; for a provincial total of 45 wells. Production in 1959 increased by 91% to 844,099 bbl, or 2,300 b/d, from the 1958 total of 438,395 bbl, or 1,200 b/d.

A recent forecast by W. D. C. Mackenzie, western producing division manager of Imperial Oil Ltd., calculated that British Columbia drilling in 1960 will exceed 200 wells. Of this total, probably half will be development oil wells.

The ratio of wildcat wells drilled to crude oil reserves discovered has been increasing very rapidly. It rose from 47,000 bbl per well in 1955 to 434,000 bbl per well in 1959. The latter figure is approaching comfortably close to the average of 900,000 bbl per wildcat well in Alberta and gives considerable hope for a substantial increase in reserves.

There are considered to be numerous good prospects for finding oil downdip or on the flanks of gas fields which are located along the tops of structural trends. One commentator has pointed out that the general impression of B.C. as being primarily a gas producing province could have been taken equally well from the situation in Alberta in 1940 when 3.5 trillion cu. ft. of gas but only about 120 million bbl of oil had been found by approximately the same number of wildcat wells as have been drilled so far in B.C.

The pipeline project: The bonds which restrained crude oil within the narrow confines of the local northeastern B.C. market were broken last fall when the provincial government granted a permit to Peace River Oil Pipe Line Co. Ltd. to build an oil pipeline from the Beatton River and Milligan Creek fields through Doig River to Boundary Lake, to pick up all the economic reserves of oil so far established.

The line is projected to run southwest from Boundary Lake to the small refinery of Pacific Petroleums Ltd. at Taylor, near Fort St. John, then to turn east to the small refinery of X-L Refineries Ltd. at Dawson Creek, starting point of the Alaska Highway. A few miles east of Dawson Creek it will cross the Alberta line, continue on to a delivery point at the Grande Prairie refinery of North Star Oil Ltd., and finally connect with the existing Alberta system of Peace River pipeline at Valleyview. This line runs south to the Trans Mountain main line at Bickerdike pumping station near Edson, and provides access for the B.C. oil to the whole refinery complex served by Trans Mountain at Vancouver and on Puget Sound in Washington, plus the Royalite refinery at Kamloops.

Provincial government policy is an important factor in setting the pace for oil market growth. The policy has been clearly expressed as encouraging the use of B.C. crude in B.C. refineries, and it has been intimated plainly that if the refiners fail to nominate for B.C. crude in ample quantity to permit fairly full operation of the line, there may have to be a form of compulsory allocation of crude supply to ensure that this does happen.

The pipeline plan involves 255.3 miles of main line, 8-inch to 12-inch diameter, of which 135 miles will be in B.C. and 120 miles in Alberta, and 13 miles of gathering lines in the fields. The initial throughput capacity will be 21,700 b/d as far as the Boundary Lake field, 25,200 b/d from Boundary Lake via Taylor to Dawson Creek, and 26,200 b/d from Dawson Creek to Valleyview.

The Peace River company is a producer-owned pipeline which was started by the producers in the Sturgeon Lake area oil fields of northwestern Alberta. It is operated by British American Oil Co. Ltd., one of the major producers, under a management contract. British American also has one of the larger refineries in Vancouver with throughput capacity of 20,000 b/d.

Cost for the line has been estimated at $8,608,200, of which 75% will be raised by a 20-year first mortgage bond issue and 25% by a common stock issue. The tariff will be in the range from 21 to 27½ cents per barrel for the entire distance from Beatton River to Valleyview, depending on questions of rate base and return which have not been settled with the provincial government. Operating economics of the fields will be improved greatly, with a much higher well-head price resulting from a reduction in the present transportation cost of trucking to the local refineries. It is generally assumed that the pipeline will start with near capacity operation, as contracts will be signed with Vancouver area refineries and with the local refineries before it is completed. Displacement of Alberta crude from the Vancouver refineries, which is the ultimate objective of the B.C. government, will take place in line with the future development of producibility of the B.C. oil fields.

As of mid-March, there was still the technicality of approval by the National Energy Board to be obtained for the Peace River pipeline, because of its crossing the provincial boundary. This was expected to be granted as a matter of course, but meanwhile engineering details were being held in suspension, with the call for bids scheduled to be made only after formal approval has been secured from the board.

The award of the permit itself, however, constituted a significant concession by the B.C. Government in the matter of relative provincial and federal jurisdiction. During the public hearings last summer, in which four pipeline companies submitted applications for permits, there was a great deal of discussion about the possible routing of the line entirely within British Columbia, so that there could be no possibility of the dominion government exercising jurisdiction over any part of it. The provincial government has always been deeply concerned about keeping the dominion out of contact with its oil and gas resources, even as indirectly as through implied jurisdiction over some aspects of pipeline operation.

By granting the construction permit for the line which crosses into Alberta, thereby requiring a concurrent permit from Ottawa, the B.C. Government acknowledged its preference for creating the most favorable well-head price scale for the oil producers, against the rigid policy of forcing the dominion government to keep "hands off" a provincial pipeline project. The expression of this policy has gone a long way to convince oil companies that their own interests are being considered, and this is expected to inspire the confidence required to go ahead with the large field development programs on which the pipeline will depend for traffic. Altogether, 1960 is shaping up as a $100-million capital investment year for B.C. END.

Oil pipeline deliveries up 12%

DURING 1959, total net oil delivered by Canadian trunk pipelines rose 12.3%, to 308,454,005 bbl from 274,772,792 in 1958. Daily average delivery in 1959 was 845,079 b/d, compared with 752,802 b/d the previous year. Provincial deliveries increased in all cases, as shown in Table 1. Exports via pipeline rose to 33,705,773 bbl from 29,750,328 in 1958, an increase of 13.3%.

Refinery products delivered during 1959 rose 6.7%, to 47,029,608 bbl from 44,056,079 in 1958. Of this total (1958 figures in parentheses); refined gasoline accounted for 24,866,285 bbl (24,245,691); distillate fuels for 17,971,451 bbl (16,259,288); and refined oil and other products for 4,191,872 bbl (3,551,100).

Operating revenues for 1959 were up 12.9%, to $86,897,575 from $76,974,046 in 1958.

Interprovincial Pipe Line regarded 1959 as its most outstanding year of operation from many standpoints. Total throughput reached a new high of 122,900,000 bbl, up 12% over 1958; and the company's net earnings were above $15 million. This was an increase of $2.9 million of the previous year and on a per-share basis represented $3.08, compared with $2.51 in 1958.

Deliveries of crude oil, summarized in Table 2, indicate a 23% increase in deliveries to Ontario. Up to last year there had been a small but diminishing tanker movement of crude oil from Superior eastward. In 1959 there were no such tanker movements. In Western Canada, crude oil deliveries rose 10.8%. Throughput in barrel-miles rose 18.8%.

Construction during 1959 added 11,000 hp to the 134,000 hp installed in pumping stations prior to the 1959 construction season. The Edmonton station was augmented by two 2,000 and one 1,000 hp electrically driven units. These were the first all-electric, "push-button" operating pumping units to be installed by Interprovincial in Western Canada. In the USA, the fourth pumping station to be remotely controlled from Superior, Wisc., was completed at Iron River, Mich.

Mechanical crude oil measurement, a program initiated at Cromer pump station in 1958, was continued and extended last year. The success of these positive displacement meters has warranted their installation at other locations. A major portion of the crude to be received at the Edmonton tank farm during 1960 will be determined by such metering. Deliveries to refiners in the Regina area as well as deliveries at Bay City, Mich., will also be handled by positive displacement meters.

Construction planned for 1960 will further increase pumping capacity in all sections of the system between Edmonton and Toronto. Kerrobert station will be enlarged to accommodate three additional pumping units. Stations at Glenavon, Sask.; Superior and Saxon, Wisc.; Gould City, Mich.; and Sarnia, Ont., will each receive one additional pumping unit. In addition, new intermediate stations planned for 1960 construction will be made near Manitou and Souris, Man.; and Donaldson and Plummer, Minn. These will be electrically powered and remotely controlled from adjacent diesel pumping stations.

Capital expenditures during 1960 are estimated to be $7,750,000. This is aimed

(*Continued on page 94*)

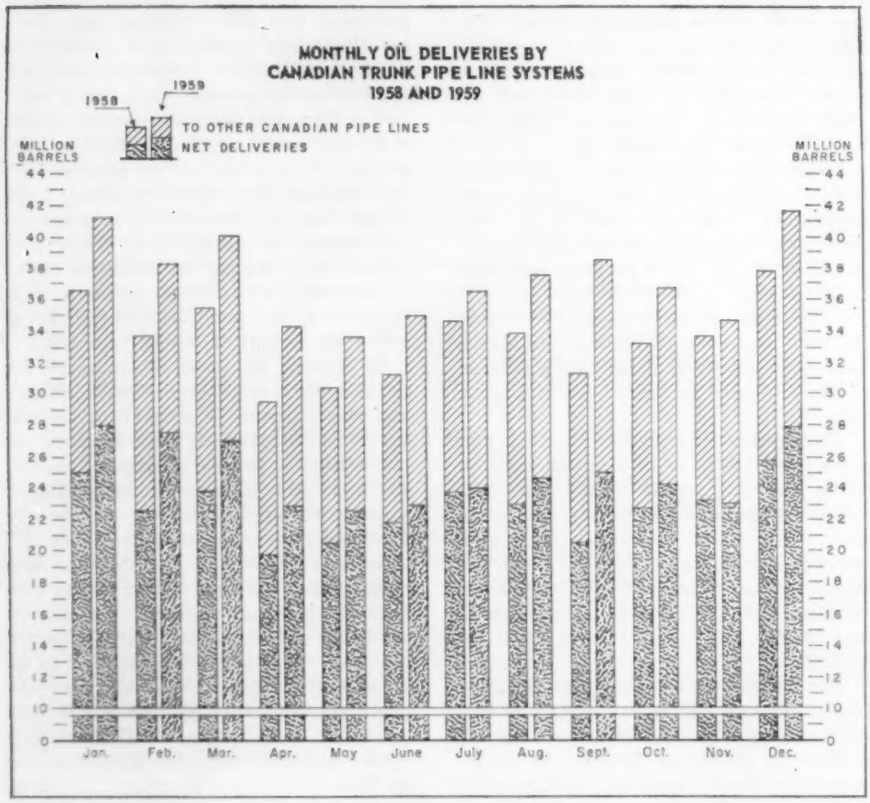

TABLE 1—Net Oil Deliveries by Province
(total in million bbls)

	1959	1958
British Columbia	35.9	29.6
Alberta	22.7	16.2
Saskatchewan	18.5	16.3
Manitoba	101.3*	91.0*
Ontario	45.7	43.3

* Includes 90.3 million bbls in 1959 (80.3 in 1958) transferred to Lakehead Pipe Line Co. at Gretna, the bulk of which moved through the USA destined to Ontario refineries. **Source:** Dominion Bureau of Statistics.

Table 2—Crude oil deliveries by Interprovincial Pipeline
(millions of barrels total)

Destination	1959	1958
Western Canada	32.7	29.5
USA Midwest	20.3	21.3
Superior for tankers	nil	1.8
Ontario	69.9	56.9
Totals	122.9	109.5

Table 3—Crude Oil Deliveries by Trans Mountain Pipeline

	1959		1958	
Destination	b/d	%	b/d	%
B. C.	61,878	63	56,431	69.7
Washington	36,361	37	24,572	30.3
Totals	98,239	100	81,003	100.0

Table 4—Summary of pipeline operating statistics

	1959	1958
Barrels handled, b/d average:		
Gathering systems	494,353	428,401
Trunk lines	1,228,194	1,098,341
Million barrel miles, trunk lines	114,154	98,142
Average miles/bbl, trunk lines	254.6	244.8
Employees and earnings[1]		
Average number[2]	1,559	1,653
Total salaries & wages	9,351,295	9,320,141
Man-hrs worked by wage earners[2,1]	853,241	855,225

[1] Excludes Amurex Oil Development Co.; Anglo American Exploration Co. Ltd.; Anglo Canadian Oils Ltd; Goliad Oil & Gas Co.; Imperial Oil Ltd., Sarnia Products Pipe Line; Kay Pipe Line Co. Ltd.; Mid-Saskatchewan Pipe Lines Ltd; Nisku Products Pipe Line Co. Ltd.; Peace River Oil Pipe Line Co. Ltd.; and Valley Pipe Line Co. Ltd.
[2] Includes salaried employees.
[3] Includes overtime.
Source: Dominion Bureau of Statistics.

there's more to Cities Service than meets the eye!

Tons of iron ore turned into molten pig iron and from this . . . steel, one of today's most vital metals. Scientists are continually at work refining, improving steel . . . from this research have come steels that can withstand the most intense heat and cold . . . steels that will help man conquer space.

It takes 523,451 men and women . . . far-reaching exploration teams, transportation systems, testing and research labs to produce the steel we use. America produces more than 85,254,885 net tons of steel each year to meet the demands of consumer and industry. The automobile industry alone used 9,587,980 net tons of steel last year. This year they will use more. Yet few of us driving our cars, or buying other steel products ever think of all that goes into manufacturing this "everyday" metal.

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Only in this way can America have what it needs for progress—more jobs and more and better oil products.

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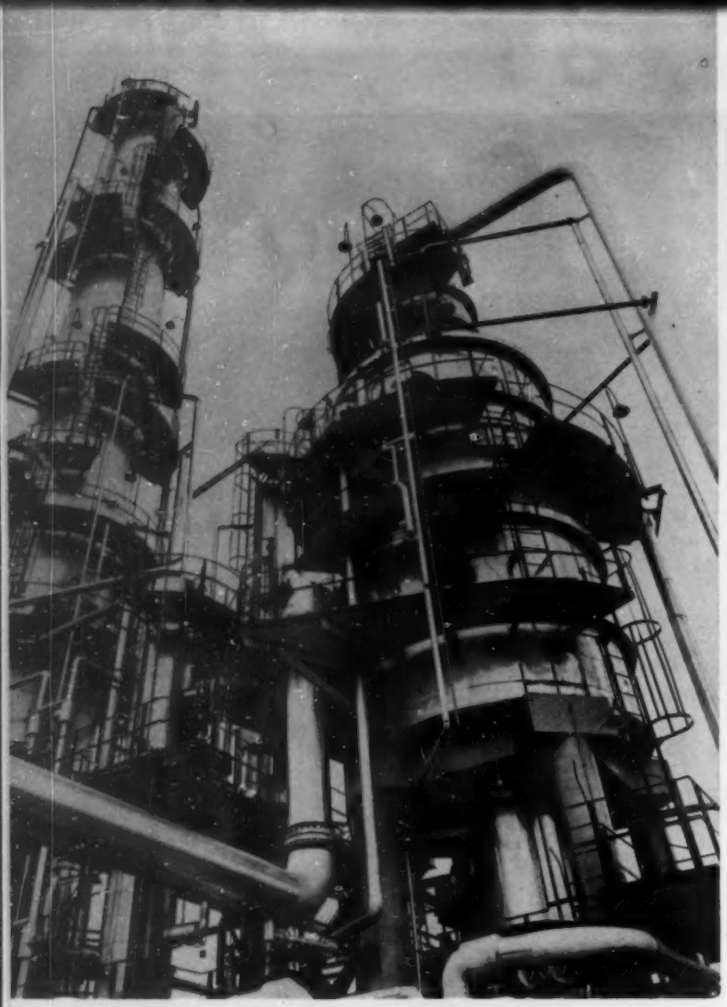


Main towers of a new crude still at Canadian Oil's Sarnia refinery, constructed during an overall $8 million program which expanded capacity to 50,000 b/d.

Two new refineries on stream—

future building prospects bright

Air view of Shell's west coast refinery at Vancouver, looking northeast up Burrard Inlet with British Columbia's mountains in background.

TWO NEW REFINERIES were completed in Canada this spring, bringing the nation's total crude oil running capacity to 945,000 b/d. The new refineries are British Petroleum's 25,000 b/d plant at Ville d'Anjou, near Montreal, Que. (see p. 51) this issue), and Irving Refining Ltd.'s 40,000 b/d plant at St. John, New Brunswick. Both went into operation last month.

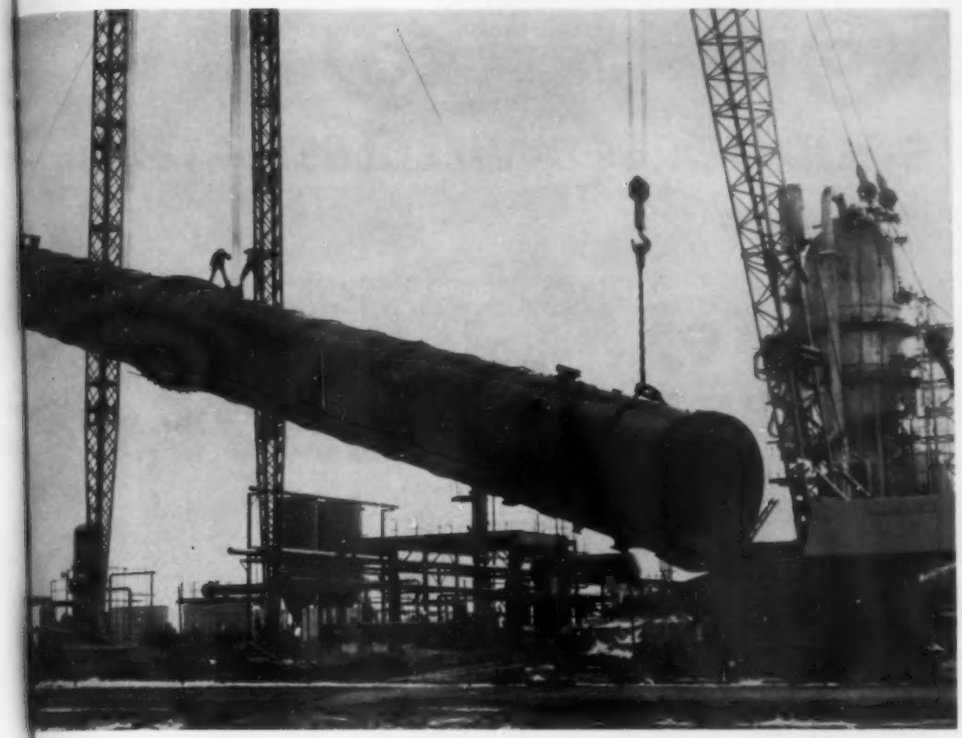
Among seven current projects still under way are two field gas processing plants which will include facilities for running crude totaling 4,000 b/d, and one refinery increase of 2,500 b/d. Thus, by the beginning of 1961, Canada's refining capacity will reach 951,500 b/d.

Capacity continues in excess of domestic demand, which was 815,000 b/d at the end of 1959, as well as total demand, 909,000 b/d.

However, the margin between demand and capacity is narrowing, and marketing authorities believe another round of construction can be anticipated during the next year to 18 months. This would mean, for example, that Shell Oil can be expected to start actual work on its temporarily shelved plans for a new 20,000 b/d refinery at Bronté near Toronto. Shell has also taken an option on 310 acres near Calgary for a new refinery of undisclosed capacity.

The outlook for 1963, or possibly 1964, is that total Canadian refining capacity may go over the million b/d mark, to an estimated 1,102,100 b/d. This represents a hefty increase of 16.7% over 1960.

Table 1 summarizes the growth trends in crude capacity and the major downstream



Slender gin-poles support a 130-ton, 154-ft iso-stripper tower being installed in new alkylation unit at British American's Clarkson refinery near Toronto. Tower was fabricated in three sections by Toronto Iron Works and welded together before raising by Procon (Canada) Ltd.

Operator opens valve to put into operation new $1.5 million, 10,000 b/d Unifiner built last year at Sarnia refinery of Canadian Oil Cos.

processes. Figures for 1961 are based upon known construction now under way. The estimates for 1963 are based on a correlation of studies by some oil company economists and studies by the editors of WORLD PETROLEUM.

It will be seen that catalytic cracking capacity is expected to rise some 119,000 b/d; catalytic reforming may go up 33,000 b/d; and hydrogen processing may increase about 12,000 b/d. Ontario is regarded as the dominant factor in the growth pattern because of its key position in recent and current increases in product demand.

A complete summary of operating refineries in Canada as of May 1, 1960, is given in Table 2, which also includes a breakdown of the various process unit capacities. It will be noted that catalytic cracking, now 287,200 b/d, is up almost 6% from its 271,400 b/d level of a year ago. Catalytic reforming increased about 4.2%, from 151,600 b/d a year ago to 158,050 b/d today.

Current projects planned for completion this year are as follows:

British American Oil Co. Ltd. is raising crude capacity of its Calgary, Alta., refinery by 2,500 b/d, to 10,000 b/d, with completion scheduled for this fall. The program will include a revamp of the existing combination, crude topping, vacuum, and thermal cracking units. A new control room will also be added to combine control instruments for the catalytic reformer, combination, and treating units.

Canadian Oil Cos. Ltd. is spending about $4 million for a new plant near Bowden, about 25 miles south of Red Deer, Alta., to operate on 4,000 b/d of gas condensate from the company's Innisfail field discovery—and capable also of processing up to 2,000 b/d of crude oil as supplementary feedstock. Completion is scheduled for late fall of this year. The principal engineering and construction contractor is Canadian Bechtel Ltd. Design was jointly by Bechtel and Canadian Oil's engineering department.

Decision to build this plant and choice of the location was based on the extensive proven reserves of natural gas with sizeable liquid byproduct yields in Alberta, according to W. Harold Rea, president, Canadian Oil Cos. Ltd.

"The abundance of these byproducts taken in conjunction with Canadian Oil's already established market for petroleum products in Alberta provides our company with a unique opportunity for their economic utilization," Mr. Rea said.

The new plant will produce an estimated

TABLE 1—CANADIAN REFINING, 1960-1963
(Barrels Daily)

		Crude Capacity	Thermal Operations	Catalytic Cracking	Catalytic Reforming	Hydrogen Processes
Alberta & NWT	1960	96,550	28,400	21,000	19,550	10,850
	1961	101,050	31,400	21,000	21,550	11,850
est	1963	117,000	31,400	26,900	26,800	12,000
British Columbia	1960	97,900	5,500	33,900	16,800	28,150
	1961	99,900	5,500	36,400	16,800	28,150
est	1963	114,000	5,500	41,700	21,000	28,150
Manitoba	1960	33,000	1,400	11,700	7,100	5,200
	1961	33,000	1,400	11,700	7,100	5,200
est	1963	44,000	1,400	17,200	9,200	5,200
Maritimes	1960	89,300	—	26,500	13,500	9,900
	1961	89,300	—	26,500	13,500	9,900
est	1963	98,300	—	46,000	15,000	11,500
Ontario	1960	264,800	58,900	69,000	40,600	16,800
	1961	264,800	58,900	69,000	46,000	16,800
est	1963	350,000	58,900	120,000	70,000	20,000
Quebec	1960	297,800	34,300	104,500	51,450	62,500
	1961	297,800	34,300	104,500	51,450	67,900
est	1963	311,000	34,300	131,000	56,500	72,500
Saskatchewan	1960	65,700	17,930	20,600	9,050	7,500
	1961	65,700	17,930	20,600	11,050	9,500
est	1963	67,800	17,930	25,700	12,000	12,000
Total Canada	1960	945,050	146,430	287,200	158,050	140,900
	1961	951,550	149,430	289,700	167,450	149,300
est	1963	1,102,100	149,430	408,500	210,500	161,350

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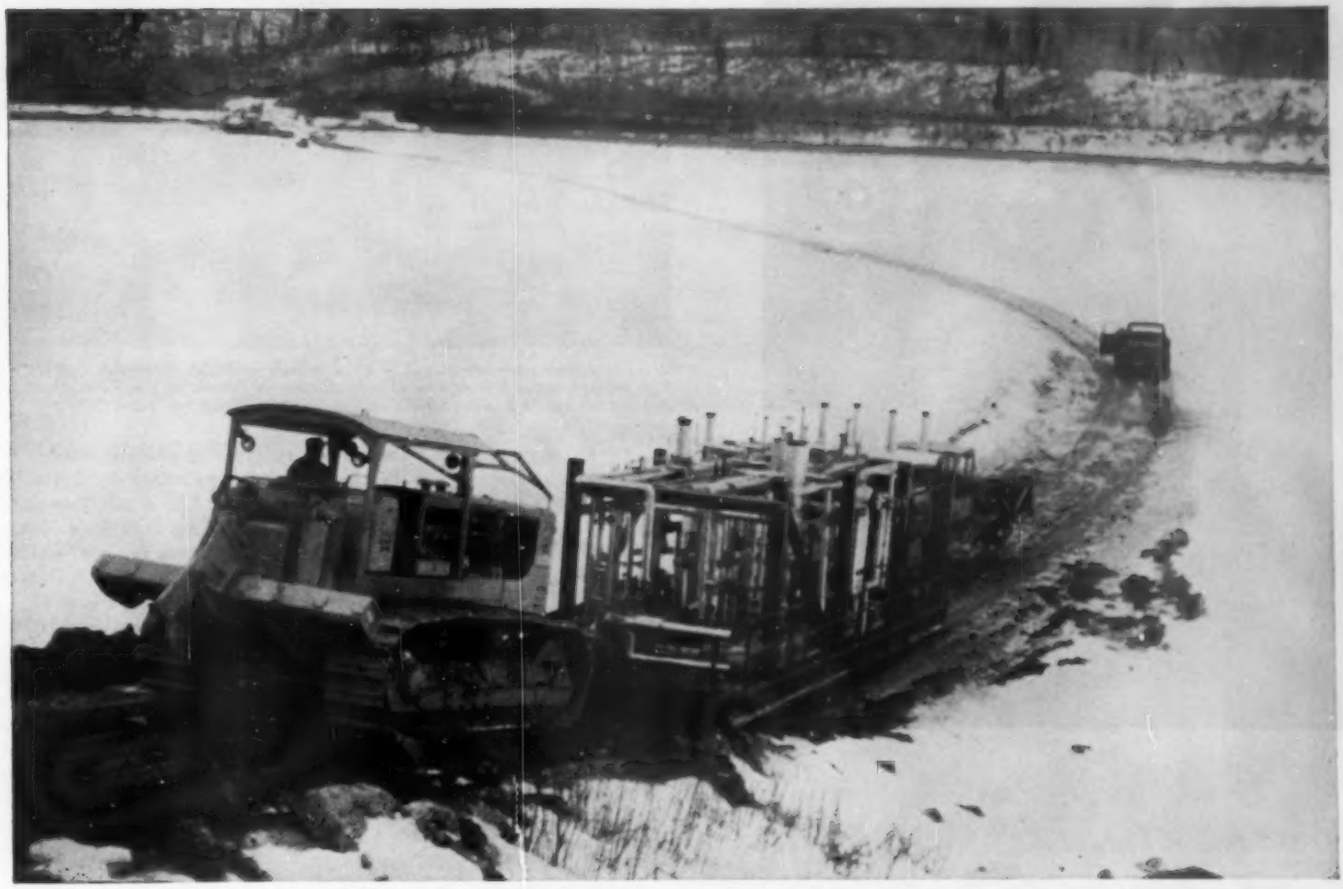

Crossing the ice bridge near Fort McMurray, the first of nine plant sections—each on self-contained runners—starts the 35-mile "skid" to the site.

KELLOGG ENGINEERS PLANTS TO

GET THERE ON TIME

A Kellogg characteristic that pays off for clients is getting plants on stream on time. For Cities Service' tar sands project in Northern Alberta, this meant not only designing and building a small diluent recovery and visbreaking plant off-site in record time but shipping it 300 miles by rail, then 35 miles by sled.

Lacking highways, railroads, docks, the site can be reached with heavy equipment only in winter by sled. Once the thaw starts, March 15, tractors bog down, wheeled vehicles are useless, the nearby river—lacking bridges—is impassable. With March 15 as the absolute deadline for delivery, Kellogg started a crash program when given the assignment in November.

Avoidingconventionaldrawings,Kellogg engineered and designed the pilot plant on a scale model, completed it by December 15, shipped it to fabricators in Edmonton as sole reference in building to full size. Meanwhile, as early as November 1, The Canadian Kellogg Company in Toronto had commenced procurement of basic materials and equipment.

By December 15, preliminary fabrication steps were well under way at Edmonton. Auxiliary equipment was beginning to arrive on order from Canadian Kellogg. Necessary subcontracts had been let in Edmonton, and work carefully coordinated.

Before the end of January, the first complete section of the plant had been dispatched to Fort McMurray. By the first week in March, all sections had been sleighed from this railhead to the plant site. To facilitate this last 35-mile trip, each section was designed so that its structural steel could be used as runners.

Executives planning additional oil refining units or petrochemical plants are invited to learn more about Kellogg's coordinated engineering-procurement-construction services and how they can speed the completion of new facilities.

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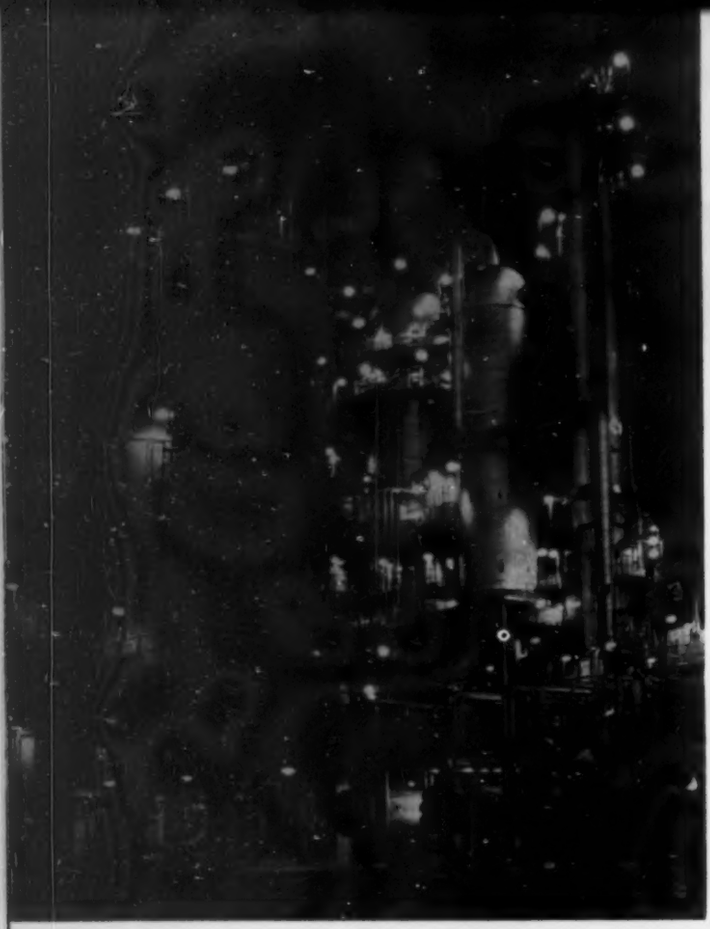
Kellogg engineers in New York examine model of plant, used in building to full size, before shipping to fabricators in Edmonton.

Section of plant loaded on flat car for shipment to Fort McMurray, nearest railhead, and from there for sleighing to the plant site.

Section of plant on way to site. Premature melting of snow in places required dragging of unit on dirt roads. Note integral runners.



Night view of new Powerformer in greatly revamped and expanded Calgary refinery of Imperial Oil Ltd.

Acres of storage tanks are gauged in a few seconds at British American's Port Moody, B.C. refinery, using first refinery-wide installation in Canada of new Varec electronic gauging system. B-A plans similar equipment at its Moose Jaw plant.

30 million gal/year of gasoline, mainly for 260 company service stations in Alberta, besides diesel fuel, and a small amount of heating oils. It is being built on a 70-acre site on the main highway between Calgary and Edmonton, with an extra 200 acres held in reserve for future expansion.

Downstream facilities being installed will include hydro-desulfurization and Platforming. Other equipment includes gasoline blending, product handling, storage, and truck loading. Storage capacity will be more than 300,000 bbl. This highly automatic refinery will be of advanced but simple design to give high gasoline yields

(*Continued on page 90*)

TABLE 2—OPERATING CANADIAN REFINERIES—1960
(as of May 1. Figures in b/d)

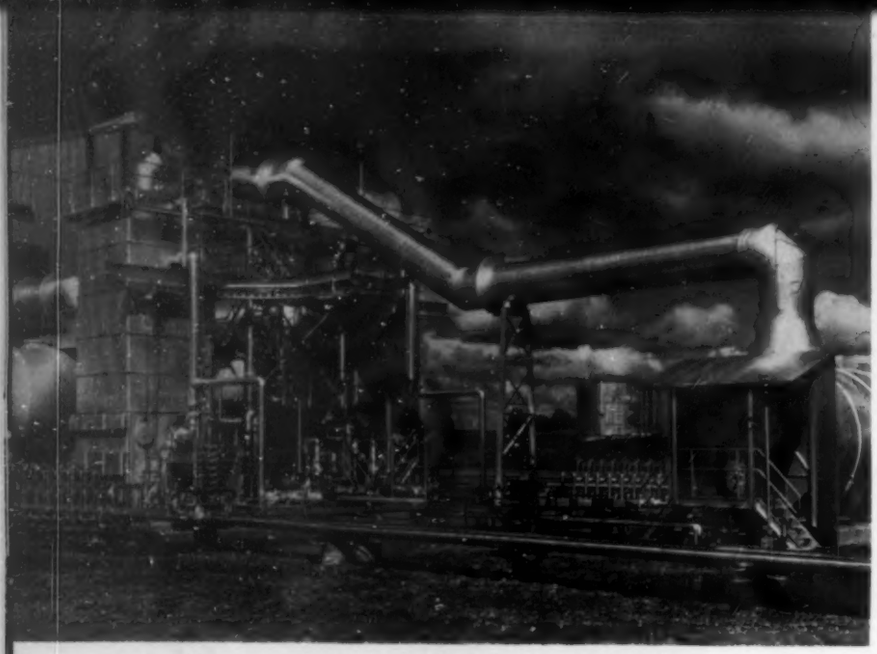
(For types of processes, see footnotes)

Company and Location	Crude Cap.	Vac. Dist.	Thermal Oper.	Cat. Cracking	Catalytic Reform	Hydrogen Proc.	Alkyl	Poly.	Lubr.	Coke	Asphalt
ALBERTA											
Anglo American Exploration Ltd., Hartell	4,000	400	1,400[a]	—	1,000[a]	—	—	60	—	—	—
British American Oil Co., Ltd. Calgary	7,500	2,500	2,500[a]	—	3,000[a]	—	—	—	—	—	900
British American Oil Co., Ltd. Edmonton	8,500	—	2,500[a] 2,100[b]	2,000[a]	6,300[a]	6,300[a]	—	—	—	65	—
Canadian Husky Oil, Ltd. Lloydminster	8,500	2,100	—	—	400[b]	1,000[a]	—	—	—	—	900
Canadian Kodiak Refineries, Ltd. Lloydminster	4,000	2,350	—	—	—	—	—	—	—	—	2,000
Imperial Oil, Ltd. Calgary	14,700	5,400	4,600[a]	7,000[b]	3,000[c]	—	870[a]	—	—	—	725
Imperial Oil, Ltd. Edmonton	28,500	6,000	9,100[a]	8,000[b]	2,000[c]	2,700[b]	1,500[b]	—	2,000	—	—
North Star Oil, Ltd. Grande Prairie	2,500	—	900[a]	—	850[d]	850[a]	—	—	—	—	—
Texaco Canada, Ltd. Edmonton	12,000	—	2,700[a] 2,000[b]	4,000[c]	3,000[c]	—	—	750	—	60	—
Wainwright Producers & Refiners, Ltd. Wainwright	5,000	1,500	600[c]	—	—	—	—	—	—	—	—
Alberta Totals	95,200	20,250	28,400	21,000	19,550	10,850	2,270	810	2,000	125	4,525
BRITISH COLUMBIA											
British American Oil Co., Ltd. Port Moody	20,000	9,000	—	9,000[a]	4,000[d]	11,200	1,050[a]	—	—	—	—
Imperial Oil, Ltd. Ioco	32,000	13,600	—	7,600[b]	5,000[c]	3,850	—	1,125	—	—	1,370
Royalite Oil Co., Ltd. Kamloops	5,000	2,180	—	1,400[d]	1,000[c]	—	—	100	—	—	700
Shell Oil Co. of Canada, Ltd. No. Burnaby	20,000	8,000	4,500[a]	6,000[d]	3,300[c]	3,300[d] 9,300[c]	—	400	—	—	2,000
Standard Oil Co. of B. C., Ltd. No. Burnaby	18,900	8,000	—	9,900[b]	3,000[c]	—	—	450	—	—	2,000
X-L Refineries, Ltd. Dawson Creek	2,000	1,350	1,000[a]	—	500[f]	500[f]	—	—	—	—	350
British Columbia Total	97,900	42,130	5,500	33,900	16,800	28,150	1,050	2,075	—	—	6,420

Company and Location	Crude Cap.	Vac. Dist.	Thermal Oper.	Cat. Cracking	Catalytic Reform	Hydrogen Proc.	Alkyl	Poly.	Lubr.	Coke	Asphalt
MANITOBA											
Anglo-Canadian Oils, Ltd. Brandon	3,000	—	1,400[a]	—	1,000[a]	—	—	50	—	—	—
Imperial Oil, Ltd. Winnipeg	18,000	7,300	—	6,500[b]	3,400[a]	2,500[b]	650[b]	—	—	—	1,100
North Star Oil, Ltd. St. Boniface	12,000	4,860	—	5,200[a]	2,700[a]	2,700[d]	—	390	—	—	—
Manitoba Totals	33,000	12,160	1,400	11,700	7,100	5,200	650	440	—	—	1,100
MARITIMES											
New Brunswick Oilfields, Ltd. Weldon, N.B.	300	—	—	—	—	—	—	—	—	—	—
Irving Refining, Ltd. St. John, N.B.	40,000	—	—	13,000[a]	7,200	5,000[a]	—	—	—	—	—
Imperial Oil, Ltd. Halifax, Nova Scotia	49,000	24,000	—	13,500[b]	6,300[a]	4,900[b]	—	2,000	—	—	1,850
Maritimes Totals	89,300	24,000	—	26,500	13,500	9,900	—	2,000	—	—	1,850
NORTHWEST TERRITORIES											
Imperial Oil, Ltd. Norman Wells, N.W.T.	1,350	—	—	—	—	—	—	—	—	—	—
ONTARIO											
British American Oil, Ltd. Clarkson	61,500	20,000	4,500[a]	11,500[a]	10,000[a]	12,000[a]	3,000	1,260	1,220	—	5,300
Canadian Husky Oil, Ltd. Fort William	3,800	1,300	—	—	1,000[a]	1,000[a]	—	—	—	—	820
Canadian Oil Cos., Ltd. Corunna	50,000	15,000	3,500[a]	12,000[a]	6,000[a]	—	—	700	—	—	—
Cities Service Refining, Ltd. Bronte	20,000	8,200	—	7,000[a]	3,500[d]	—	—	—	—	—	—
Imperial Oil, Ltd. Sarnia	94,500	30,000	4,000[a] 28,000[b] 4,000[a] 8,000[d]	20,000[b]	15,000[c]	3,800[b]	1,500	—	3,200	25	2,300
Regent Refining, Ltd. Port Credit	20,000	9,200	3,600[a]	7,000[a]	2,100[a]	—	—	660	—	—	—
Sun Oil Co., Ltd. Sarnia	15,000	—	3,300[a]	11,500[a]	3,000[f]	—	—	—	—	—	—
Ontario Totals	264,800	83,700	58,900	69,000	40,600	16,800	4,500	2,620	4,420	25	8,420
QUEBEC											
British American Oil, Ltd. Montreal East	50,000	17,000	5,500[a]	22,000[a]	13,000[a]	17,000[a]	—	630	330	—	12,000
British Petroleum Canada, Ltd. Ville d'Anjou	25,000	—	—	9,000[a]	6,000[a]	12,000[a]	—	800	—	—	—
Canadian Petrofina, Ltd. Ponte-aux-Trembles	30,000	14,500	3,800[b]	12,000[a]	4,500[a]	4,500[b] 4,000[c]	1,500[a]	450	—	80	—
Imperial Oil, Ltd. Montreal East	71,800	35,500	10,500[a]	19,500[b]	9,450[a]	7,000[b]	—	2,300	—	—	4,650
Shell Oil of Canada, Ltd. Montreal East	62,000	33,000	7,000[a] 7,500[a]	22,000[a]	7,500[a]	9,000[c]	1,500[b]	1,200	—	—	6,000
Texaco Canada, Ltd. Montreal East	59,000	—	—	20,000[a]	11,000[a]	9,000[f]	2,000[a]	1,500	—	—	—
Quebec Totals	297,800	100,000	34,300	104,500	51,450	62,500	5,000	6,880	330	80	22,650
SASKATCHEWAN											
British American Oil, Ltd. Moose Jaw	15,000	5,500	1,500[a] 2,250[b]	4,500[a]	5,400[a]	6,500[a]	—	390	—	100	1,200
Canadian Husky Oil, Ltd. Moose Jaw	3,200	1,300	1,300[a]	—	650[a]	1,000[a]	—	—	—	—	900
Consumers' Cooperative Regina	16,000	6,500	3,000[b]	5,000[a]	—	—	—	—	—	145	—
Imperial Oil, Ltd. Regina	22,500	10,700	4,500[a]	8,500[b]	3,000[c]	—	—	1,000	—	—	550
Northern Petroleum, Ltd. Kamsack	1,000	—	—	—	—	—	—	—	—	—	—
Royalite Hi-Way, Ltd. Saskatoon	8,000	—	1,600[a] 3,780[c]	2,600	—	—	—	250	—	—	300
Saskatchewan Totals	65,700	24,000	17,930	20,600	9,050	7,500	—	1,640	—	245	2,950
Canada Totals	945,050	306,240	146,430*	287,200	158,050	140,900	13,470	16,465	6,750	475	47,915

* Total thermal cracking 53,700 b/d.
Note: Totals for coke are in ton/day.
Note: See code for explanation of types of processes.

Thermal processes: a—cracking; b—coking; c—visbreaking; d—reforming; e—decarbonizing.
Catalytic cracking: a—Orthoflow; b—Model IV; c—Fluid; d—UOP Fluid; e—Houdriflow.
Catalytic reforming: a—Atlantic; b—Cycloversion; c—Powerforming; d—Sinclair-Baker; e—Platforming; f—Houdriforming; g—Ultraforming.
Hydrogen Processes: a—Desulfurization; b— Hydrofining; c—Sinclair-Baker; d—Unifining; e—Shell; f—Hydrotreating.
Alkylation: a—Sulfuric acid; b—HF.



Sulfur recovery plant of Texas Gulf Sulphur Co. at Okotoks, Alta. (Courtesy Shell Oil Co. of Canada Ltd.)

TABLE 1—CANADIAN SULFUR RECOVERY PLANTS

(Operating, as of April 1, 1960)

Company	Location	Capacity ton/day
British American Oil Co., Ltd.	Nevis Field, Alta.	*
British American Oil Co., Ltd.	Pincher Creek, Alta.	675
Consolidated Mining & Smelting	Turner Siding, Alta.	20
Imperial Oil, Ltd.	Redwater, Alta.	11 to 25
Irving Refining, Ltd.	St. John, N.B.	30
Jefferson Lake Petrochemicals	Ft. St. John, B.C.	300
Laurentide Chemicals & Sulfur	Montreal East, Que.	100
Royalite Oil Co., Ltd.	Turner Valley, Alta.	25 to 40
Shell Oil of Canada, Ltd.	Jumping Pound, Alta.	90
Steelman Gas, Ltd.	Steelman, Sask.	7.5
Texas Gulf Sulfur Co.	Calgary, Alta.	370
	Total, approx.	1,658

(Projected, as of April 1, 1960)

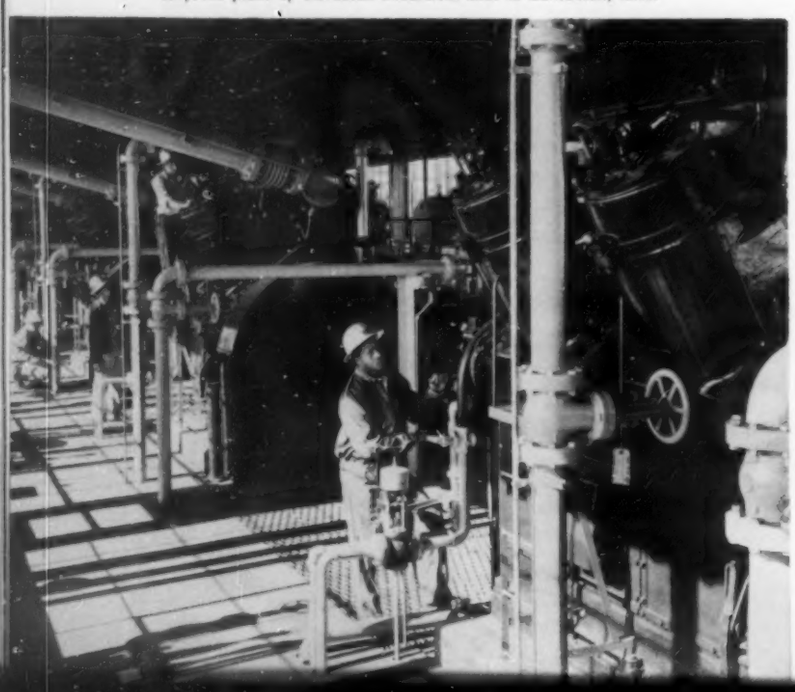
Borden Chemicals, Ltd.	*Manitoba	*
British American Oil Co., Ltd.	Dick Lake-Homeglen, Alta.	233
California Standard	Homeglen-Rimbey, Alta.	300
Canadian Oil Co., Ltd.	Innisfail Field, Alta.	80
Jefferson Lake Petrochemicals	Calgary, Alta.	350
Jefferson Lake Petrochemicals	Coleman, Alta.	550
	Total, approx.	1,513

* Not disclosed

Canada's petrochemicals —

no slowdown in sight

A row of gas compressors at the multi-million dollar polyethylene plant of Canadian Industries Ltd. at Edmonton, Alta.



IF THERE IS ANY quick way to describe the status of Canada's petrochemical industry today it is to use the simple phrase—no slowdown in sight.

As shown in the accompanying charts, supply, demand, and productive capacity are all maintaining rapid rates of increase, and will continue to do so in the foreseeable future.

Supply and demand for all Canadian petrochemicals were reported in recent estimates and forecasts by C. M. Beamer of Imperial Oil Ltd. (see Fig. 1). Demand, which includes export as well as domestic consumption, has risen from approximately 1.3 billion lb/yr in 1955 to 2.25 billion last year, and is expected to rise above 4.5 billion by 1965. Production is keeping pace; during the past 10 years its growth has been more than 19% annually.

The lion's share of the growth has been in sulfur, and these figures do not include sulfur removed from pyrites or other non-petrochemical sources. The rapid growth of natural gas in the western provinces, heavy in sulfur content, will continue to spark this trend. Note also the number of planned large sulfur recovery plants. (Table 1).

It is possible that demand for sulfur will drop off in the near future because of the difficult marketing problem it poses; plants are at a considerable distance from large volume markets. However, sulfur must be removed as a necessary step in the purifica-

TABLE 2—ESTIMATED PROVED RESERVES OF SULFUR IN CANADA
(1,000 long tons)

	B.C.	Alberta	Sask.	Total Canada
Proved reserves, 12/31/58	1,500	45,180	59	46,739
Changes in 1959 due to revisions & extensions	−116	4,228	—	4,112
Discoveries, 1959*	43	178	—	221
Production, 1959	50	222	1	273
Proved reserves, 12/31/59	1,377	49,364	58	50,799

Source: Canadian Petroleum Association.

* Only a limited area is assigned to each new discovery, even though the CPA committee may believe that eventually a much larger area will produce; hence discovery figures are to be considered minimum figures.

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Dow Chemical's styrene plant at the Sarnia, Ont., works.

tion of natural gas. This means that recovery plants will continue to be built. Fortunately, sulfur can be stored indefinitely outdoors on the ground and creates no immediate problems to the natural gas processor.

Evidence of the amount of sulfur available in Canada was given in the first estimate ever made of proved reserves of sulfur, by the Canadian Petroleum Association at its annual meeting in March. As shown in Table 2, total proved reserves of sulfur in the three provinces of B. C., Alberta, and Saskatchewan at the end of 1959 were over 50 million long tons.

A number of interests in Alberta have been working on the development of a proposal for a pipeline to market areas in the USA Midwest and Great Lakes areas. The line would carry sulfur in a slurry, or possibly in the form of hydrogen sulfide gas. A companion proposal being developed by the same group, Pembina Pipe Line Ltd., would also carry natural gas liquids to ready buyers in the same areas. (See also, "Sulfur May Move by Foothills Pipeline," WORLD PETROLEUM, May, 1959, p. 80.) Completely feasible technically, the project still faces some problems in economics; cost of such a line has been estimated at $150 million.

In any event, vast quantities of sulfur do exist and will be removed from Canada's natural gas. This indicates a continuing substantial investment in new plants to handle the job. (See also article on p. —, this issue.)

In the organic category, one of the significant fields for growth is in plastics and resins. The continuing step-up of production is expected to bring Canadian capacity to above 500 million lb/yr by 1965.

In addition to the many existing applications for plastics, a large number of new opportunities are in sight, Mr. Beamer pointed out. In the building trades, the surface has barely been scratched. For example, a fireproof polystyrene which will be useful as a structural material is now under development. Phenolic resins are expected to find important insulation applications. A good market booster for vinyls and other polymers could be the long-awaited development of a satisfactory exterior latex paint. The use of plastics in small boats, long under development, has now hit the field solidly, and in the USA, for example, growth rates of 20% are being forecast.

A good way to demonstrate petrochemicals growth in Canada is with the extremely versatile starting material—ethylene. Market analyses point to an ethylene demand in 1965 about 2.25 times that of 1959 (see Fig. 2). Note that ethylene capacity today exceeds demand by a wide margin. This situation will hold for some time yet; however, it is expected to balance out by 1965. It is predicted that by that year, over one-third the number of Canadian produced organic petrochemicals will use ethylene somewhere in their synthesis.

The largest single product using ethylene has been ethylene glycol. Growth in the past for this material has been in direct relation to its replacing alcohol materials as automotive anti-freeze. As a result, its future growth is tied rather closely to motor vehicle registrations. Makers will have to turn to new fields, and the development of polyester fibers and resins is one in which good progress is being made.

Another material related to motor vehicles is ethyl chloride, which enters into the production of tetraethyl lead. Up to now, most of Canada's requirement has been imported, but with the completion this year of Ethyl Corp.'s new unit at Sarnia, the imports will have stopped; Ethyl will use ethylene from Imperial Oil's plant nearby.

This year the most important ethylene derivative will be polyethylene, a plastic which has truly earned its title as a "wonder material," because it performs so much better than other materials at the same cost. Substantially larger volumes will soon be moving into the market with completion of Carbide Chemical's 25 million lb/yr expansion this year at Montreal and du Pont's new unit of undisclosed size at Sarnia. And the end is still nowhere in sight, considering further increased interest in markets for polymer blends and copolymers of ethylene and propylene.

In terms of physical plant and productive capacity for petrochemicals, the growth story is similar in every respect to demand, as evidenced in the chart in Fig. 3.

Canada today has 29 companies operating 36 petrochemical plants. A total of 14 companies has 19 construction projects planned or now under way to expand existing facilities or install new ones. Of these 19 projects, 12 are actually under way and seven are still in the planning stage. In another two years, the number of companies will reach 33 and the plants will total 48.

Investment in operating plants—about $575 million at the end of 1958—will reach an estimated $650 to $700 million at the end of this year.

Details of existing and planned new facilities for sulfur and ammonia are given in Tables 1 and 3. All the definitely planned sulfur plants will be in the sour natural gas fields of Alberta, and all of them will be considerably larger than existing plants except for British American's huge Pincher Creek plant. As a result, plants now expected to reach operational stage within the

TABLE 3—CANADIAN AMMONIA PLANTS
(Operating, April 1, 1960)

Company	Location	Products and Capacities, ton/day
Canadian Industries, Ltd.	Millhaven, Ont.	Anhydrous ammonia, 200
Consolidated Mining & Smelting Co.	Calgary and Turner Siding, Alta.	Ammonia, 325 Ammonium nitrate, 200
Cyanamid of Canada*	Welland, Ont.	Ammonia, 150 Urea, 184 Ammonium nitrate
Dow Chemical Co.	Sarnia, Ont.	Ammonia
Northwest Nitro-Chemicals	Medicine Hat, Alta.	Ammonia & nitrogenous fertilizers
Sherrit Gordon Mines	Ft. Saskatchewan, Alta.	Ammonia, 180 Ammonium sulfate, 275
(Projected, as of April 1, 1960)		
Sogemines, Ltd.	Brockville, Ont.	**

* Being converted from coal to natural gas as raw materials at cost of $5 million, this year.

** Not disclosed.

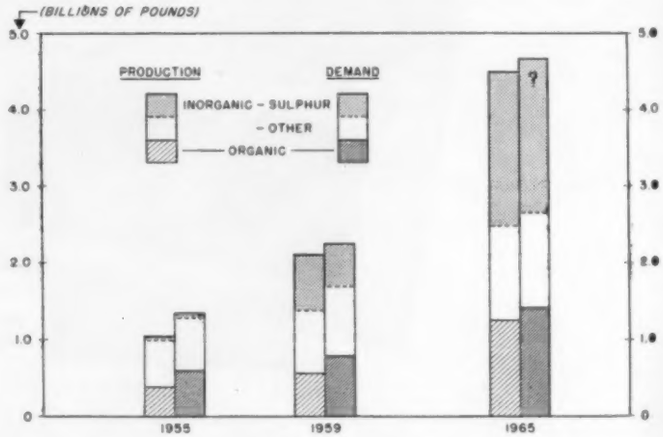

Fig. 1—Supply and demand for Canada's petrochemicals.

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Locust hordes reported! Place – the BP Research Centre at Sunbury-on-Thames. Here scientists are busy breeding and killing the insects to test new solvent oils which will provide even more effective bases for insecticides.

BP

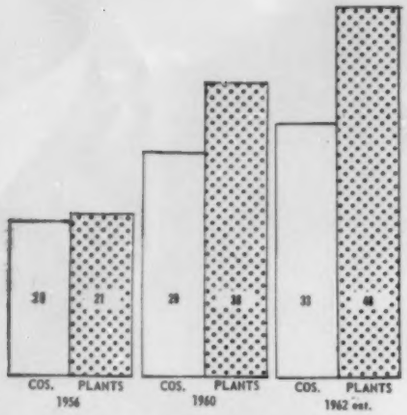

Fig. 3—Growth in Canada's petrochemical industry; number of companies and plants. The 1962 estimate is based on known construction this year.

next year to 18 months will virtually double sulfur recovery capacity.

Plant capacity for ammonia and its derivatives, on the other hand, has reached a plateau. An increase in use of natural gas will result from the shift being made by Cyanamid at Welland from coal as raw material this year.

Information on other types of petrochemical plants now operating, being constructed, or still in the planning phase is as follows (new projects are shown in boldface type):

B-A Shawinigan Ltd., Montreal East, Que., manufactures more than 30 million lb/yr of phenol, more than 17 million lb/yr of acetone, and undisclosed amounts of isopropanol, methyl ethyl ketone, and bisphenol.

Borden Chemicals Ltd. is building a $550,000 sulfuric acid plant near Winnipeg, to operate on sulfur from Alberta.

British American Oil Co. Ltd., Montreal East, Que., makes 600 b/d of cumene for the B-A Shawinigan plant, which it produces from propylene and benzene.

Cabot Carbon Co. of Canada Ltd., Sarnia, Ont., manufactures more than 55 million lb/yr of carbon black of all types, using hydrocarbon streams from its refinery neighbors.

Another new carbon black plant is scheduled to begin operations in 1961, this one at Toronto, Ont., for Columbian Carbon (Canada) Ltd., with an initial capacity of 40 million lb/yr.

Canadian Chemical Co. Ltd. at Edmonton, Alta., utilizes streams from local refineries, principally butane and propane, to produce such petrochemicals as pentaerythritol, methanol, propanol, glycols, propyl acetate, acetic acid, acetone and ketones, aldehydes, and cellulose acetates.

A $4 million expansion, planned for completion early in 1961, will boost product capacity by 40%.

Canadian Industries Ltd. conducts petrochemical processing at two of its plants. At Edmonton, Alta., natural gas is the raw material, and 40 million lb/yr of polyethylene is produced. At Millhaven, Ont., 200 ton/day of anhydrous ammonia is produced as well as the polyester "Terylene." Raw materials are fuel oil, ethylene glycol, and terephthalic acid.

CIL is scheduled to complete new facilities this June at Beloeil, Que., to produce pentaerythritol tetranitrate, the first such plant in Canada. Cost is $500,000.

Canadian Oil Cos. Ltd. produces the aromatics—benzene, toluene, xylenes—as well as ethylene, propane-propylene, butane-butylene, and various solvents at Corunna, near Sarnia, Ont.

Carbide Chemicals Co. uses refinery gases in the Montreal East, Que., area to produce ethylene, ethylene oxide, ethylene glycols (50 million lb/yr), polyethylene glycols, glycol ethers, ethanolamines, and polyethylene (40 million lb/yr).

Carbide's polyethylene capacity will be raised to 65 million lb/yr by the middle of this year.

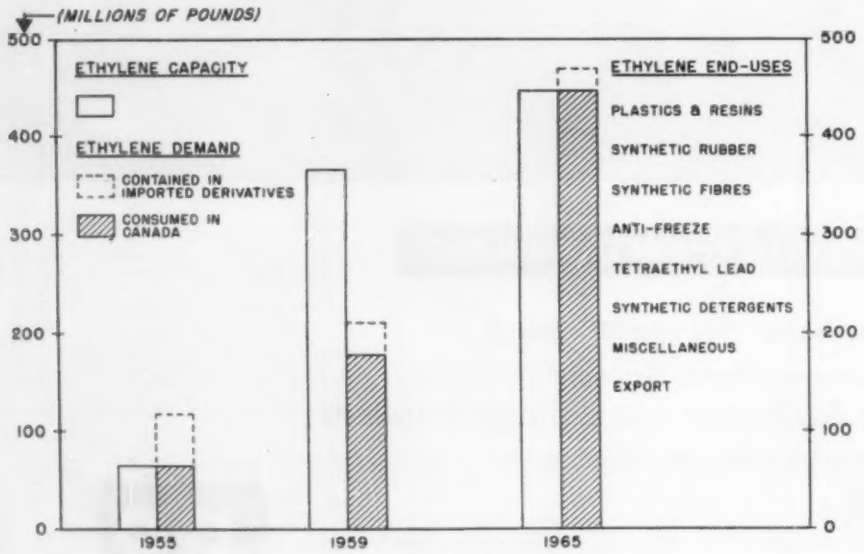

Fig. 2—Supply and demand for Canada's ethylene.

Dow Chemical Co. of Canada Ltd. manufactures a wide range of products at Sarnia, including carbon tetrachloride, ethanolamines, ethylene glycols, ethylene oxide, dichloroethyl ether, ethanolamine, ethyl chloride, perchloroethylene, styrene and polymers, styrene-butadiene latex, polyethylene, and ammonia.

Dow is building two new plants this year, one at Fort Saskatchewan, Alta. and the other at a site near Vancouver, B.C. Work on the Alberta plant began this spring; the facilities will provide for manufacture of ethanolamines, glycols, and pentachlorophenol. It is expected that the pentachlorophenol unit will go into operation late in 1960 or early 1961, and the other units in late summer of 1961. The Vancouver plant will produce phenol.

Du Pont of Canada Ltd., Maitland, Ont., makes adipic acid, hexamethylene diamine, chlorofluoromethanes, hydrogen peroxide, and acrylic fibers.

At Sarnia, Du Pont is scheduled to start up a new low pressure process polyethylene plant this year.

Ethyl Corp. of Canada Ltd. manufactures tetraethyl lead compound at Sarnia.

Imperial Oil Ltd. produces a large number of petrochemicals at its Sarnia, Ont., refinery, including tri- and tetra-propylene, detergent alkylate (30 million lb/yr of alkyl aryl benzene), solvents, ethylene, propylene, butadiene, butylenes, aromatic distillates, and petroleum polymers.

Lubrizol of Canada Ltd. manufactures lubricating oil additives at Niagara Falls, Ont.

Monsanto Canada Ltd. is scheduled to complete a new maleic anhydride unit late this year at Montreal, Que., where it now produces 20 million lb/yr of polystyrene.

New Surpass Petrochemicals Ltd., Scarborough, Ont., makes a full line of specialties—petroleum sulfonates and derivatives, additives, corrosion inhibitors, rust preventives, and greases.

The major synthetic rubber facility in Canada is the government's Polymer Corp. plant at Sarnia. A complete range of products are made, totaling annually some 135,000 long tons.

Reichhold Chemicals (Canada) Ltd. has two new projects under way. Facilities for phenol and formaldehyde production are planned at Port Moody, B.C., and a new 7 million lb/yr phthalic anhydride unit is being built at St. Therese, Que.

St. Maurice Chemicals, a division of Shawinigan, produces formaldehyde and pentaerythritol at Varennes, Que.

Shell Oil of Canada Ltd.'s petrochemical operations are at Montreal, where it produces isopropanol, acetone, sec-butanol, methyl ethyl ketone, epoxy resins, and detergent alkylate.

Sun Oil Co. Ltd. uses refinery streams at Sarnia, Ont., to make butylenes.

Texaco Canada Ltd. is involved in petrochemicals at two refineries: at Montreal East, ethylene is produced, and at Edmonton, various petrochemical feedstocks. END

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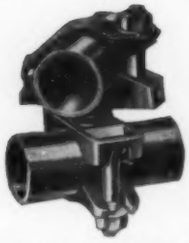

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A Shell Oil seismic crew drilling a shot-hole in northern British Columbia.

Canadian geophysical activity 25.5% lower in 1959

GEOLOGICAL ACTIVITY IN CANADA in 1959 continued its downward trend for the eighth consecutive year. Geophysical activity totaled 841 party-months in 1959 as against 1,130 party-months during 1958, a drop of 25.5%

Both seismic and gravity work recorded decreases; seismic dropping about 25%, from 1,065 party-months in 1958 to 796 party-months in 1959; and gravity work about 37%, from 65 in 1958 to 41 in 1959.

Alberta, as usual with the largest number of crews, continued its downward trend, going from 667 party-months in 1958 to 554 party-months in 1959, a decrease of 17%. The sharpest drop was recorded in Saskatchewan, 69%, from 285 in 1958 to 89 in 1959, affected primarily by a heavy decline in seismic party-months.

Evidence of the increased interest further north was shown, however, in the rise in seismic work in two areas—British Columbia and the Northwest Territories. An increase from 106 to 121 party-months was shown in B.C. seismic activities, up 12.4%, and the N.W. Territories rose 43%, from 21 in 1958 to 30 party-months in 1959. There was also a small increase in gravity work in the Territories.

In general, gravity work returned to approximately the level of 1957 and earlier years, 38 to 41 party-months total for the year. The higher level of gravity work in 1958 was due primarily to crews working in Ontario. However, some new activity was also reported in gravity work in the Maritimes in 1959.

A breakdown of work by contracting companies (not shown on the table) shows the following comparisons; 1959 seismic, contractors—61%; 1958 seismic, contractors—70%; and 1959 gravity, contractors—95%; 1958 gravity, contractors—95%.

Industry feeling generally is that the growing interest in oil searching in the northern areas may result in a continued increase in geophysical work there, which in turn may hold the overall total activity in 1960 to approximately last year's level. Offsetting this opinion, of course, is the fact that northern areas have climactic conditions which limit work to a relatively few winter months when the muskeg freezes.

END.

CANADIAN GEOPHYSICAL ACTIVITY BY PARTY-MONTHS

	Seismic		Gravity		Totals	
Province	**1959**	**1958**	**1959**	**1958**	**1959**	**1958**
Alberta	549	654	5	13	554	667
British Columbia	121	106	3	1	124	107
Manitoba	6	8	—	—	6	8
Saskatchewan	88	276	1	9	89	285
N.W. Territories	30	21	7	2	37	23
Ontario[1]	—	—	15	40	18[1]	40
Nova Scotia[2]	2	—	6	—	9[2]	—
New Brunswick	—	—	4	—	4	—
	796	1,065	41	65	841	1,130

[1] Ontario 1959 total includes 3 crew-months in other than seismic, gravity or magnetic work.
[2] Nova Scotia 1959 total includes 1 crew-month in magnetic work.
This tabulation does not include aerial magnetic work, which cannot be expressed in party-months.

Source: Homer G. Patrick, chairman, Committee on Geophysical Activity, Society of Exploration Geophysicists.

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Canada ready to start many gas plant building projects

WITH GOVERNMENT APPROVAL of the export of natural gas now virtually assured, Canadian companies are ready to embark on a sizable spending program of constructing new field gas processing plants.

During the next year or two, there will be 19 or 20 new processing plant projects started, representing a total capital investment in the range of $115 million. This amount includes processing facilities proper plus gathering systems and the like. Of the projected units, 12 are expected to include sulfur recovery and the balance will be straight gas processing. No further details can be reported until these projects are announced.

In addition to these anticipated projects, five programs are actively under construction today, and two other confirmed projects on which the go-ahead had been waiting approval on gas export. These seven represent a capital investment of some $65 million, and five of them include sulfur recovery, the total capacity of which will be approximately 1,500 ton/day long.

All these projects are going to raise gas processing plant capacity considerably over the 1,400 mmcf/d in the 27 existing plants, summarized in Table 1. Even the current, known construction will raise capacity to more than 2,000 mmcf/d by next year.

Tied in directly with the anticipated heavy construction of new processing plants is, of course, the proposed expansion of the Alberta Gas Trunk Line Co. Ltd., and particularly its foothills division. A detailed discussion of this line and other developments in Canada's natural gas industry appears in the article beginning on p. 00 in this issue.

Construction during the past year was relatively slow, understandable in view of the unsettled export situation. It consisted primarily of expansion to existing facilities and totalled $9,100,000.

British American Oil Co. Ltd. spent about $1.5 million to boost capacity at its Nevis field, Alta. plant by some 25 mmcfd. Poole-Pritchard Canadian Ltd. was the contractor.

Canadian Pacific Oil & Gas Ltd. spent about $85,000 for a new 10 mmcfd gas processing plant to serve the Hussar field, about 75 miles east of Calgary, Alta. Total cost, including plant, gathering system, and well-head equipment was approximately $300,000. There was no principal contractor; the unit is a skid-mounted, prefabricated type, using dry desiccant as adsorbent.

In the Carstairs field of Alberta, Home Oil Co. Ltd. and participants completed a new 66 mmcf/d plant this past March at a cost of approximately $3.6 million, with Fluor Corp. Ltd. as the contractor. Ultimate capacity of the plant will be 75 mmcf/d. Natural gasoline output is 100,000 Imp. gal/day. Participating with Home Oil as the operator are Canadian Superior Oil of Canada Ltd., Tennessee Gas Transmission Co., Texaco Exploration Co., British American Oil Co. Ltd., and Hudson's Bay Oil and Gas Co. Ltd.

Steelman Gas Ltd. finished an expansion program late in 1959 at its plant at Estevan, Sask., serving the Steelman gas field. Capacity was increased by 2 mmcf/d at an estimated cost of $800,000.

In the Windfall field of Alberta at Whitecourt, Canadian Fina Oil Ltd. built a "pilot plant operation" of 30 mmcf/d capacity, at a cost of $3 million. Contractor was Stearns-Roger. The plant is designed to produce 2,500 b/d of condensate in addition to the gas.

Tennessee Gas Transmission Co. spent $115,000 last year on a new gas processing

(*Continued on page* 92)

TABLE 1—CANADIAN GAS PROCESSING PLANTS, OPERATING
(as of April 1, 1960)

Company & Location	Field	mmcfd	Sulfur ton/day	Expansion Investment, 1959
Ajax Petroleums, Ltd. St. Albert, Alta.	St. Albert & Morinville	20	—	—
Anglo American Exploration Hartell, Alta.	So. Turner Valley	10	—	—
British American Oil Pincher Creek	Pincher Creek	196	675	—
British American Oil Stettler, Alta.	Stettler, Nevis & Fenn-Big Valley	35	—	$1,500,000
California Standard Co. Princess, Alta	Princess	12	—	—
Canadian Fina Oil Whitecourt, Alta.	Windfall	30[1]	—	$3,000,000
Canadian Pacific Oil & Gas Hussar, Alta.	Hussar	10	—	$85,000
Goliad Oil & Gas Drayton Valley, Alta.	Pembina	90.7	—	—
Home Oil Co., Ltd. Carstairs, Alta.	Carstairs	66[2]	—	$3,600,000
Hudson's Bay Oil & Gas Cessford, Alta.	Cessford	125	—	—
Imperial Oil Devon, Alta.	Leduc-Woodbend	35	—	—
Imperial Oil Redwater, Alta.	Redwater	10.8	11–25	—
Mid-Western Industrial Gas Alexander Indian Reserve, Alta.	Alexander	55	—	—
Phillips Petroleum[3] Taylor, B.C.	Ft. St. John, West Buick Creek, Kobes Creek & Highway	300	—	—
Progas, Ltd. Acheson, Alta.	Acheson	5	—	—
Provo Gas Producers Consort, Alta.	Provost	60	—	—
Royalite Oil Co. Turner Valley, Alta.	Turner Valley	90	25–40	—
Saskatchewan Power Coleville, Sask.	Coleville, Milton & Hoosier	60	—	—
Shell Oil Cochrane, Alta.	Jumping Pound	90	90	—
Smiley Gas Conservation Smiley, Sask.	Smiley	3	—	—
Steelman Gas Estevan, Sask.	Steelman	20.5	7.5	$800,000
Tennessee Gas Transmission Co. Rosedale, Alta.	Wayne-Rosedale	7	—	$115,000
Texaco Exploration Bonnie Glen, Alta.	Bonnie Glen Wizard Lake & Glen Park	25	—	—
Texaco Exploration Cynthia, Alta.	Pembina	10.5	—	—
Texas Gulf Sulfur Okotoks, Alta.	Okotoks	11	370	—
Union Gas Co. Port Alma, Ont.	Tilbury, D'Clote Lake Erie & Morpeth	16	—	—
Western Leaseholds Hobbema, Alta.	Samson	3	—	—
Total		1,396.5	1199–1228	$9,100,000

[1] Designated by Fina as a pilot plant. Contractor, Stearns-Roger.
[2] Aimed at ultimate capacity of 75 mmcfd. Contractor, Fluor Corp.
[3] Phillips is building 2,000 b/d crude oil refining facility at Taylor. See Table 2, p. 00.

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World crude production rises 5% in first quarter

WORLD PRODUCTION of crude petroleum made steady progress during the first quarter of 1960. It rose to 20,446,758 barrels daily, 5% over the average of 19,470,768 barrels daily in 1959. The rate of increase is slightly below 1959, when production rose 6.4% over the preceding year of 1958.

The most striking increase was in Africa, which almost tripled its production from 55,037 b/d in 1959 to 141,790 b/d in the first quarter of 1960. The increase was due to the completion of the Hassi Messaoud pipeline which began delivering crude to shipside in December of 1959. The same area will continue its rise in 1960, especially in the last quarter when another pipeline, this time from the Edjeleh area of Algeria, begins operation. Crews are laying pipe at this moment across the sand seas of Tunisia and eastern Algeria.

Another striking increase was registered in Argentina, where the results of a new policy began to pay off when crude production rose from 122,418 b/d in 1959 to 131,000 b/d in this first quarter. Production levels will rise more steeply from now on, since Pan American has completed its 25,000 b/d pipeline to the coast which began operation on March 18th. This will add a like amount to the total from this date on, and other producers in the country will do their part to almost double the country's production within a few years.

The largest volumetric increase was registered in the US, where continued import controls brought a raise in production of some 201,165 b/d, up about 3%. The increase was less than that registered in 1959 when U.S. production rose some 5.1%.

Venezuela registered a substantial increase from 2,771,000 b/d to 2,912,500 b/d, a 5.1% increase, but this rate is not expected to continue this summer since demand for Venezuelan crudes, principally heavy oil, is highest in periods of cold weather. The country is expected to register somewhat below its hoped-for 4% increase in 1960.

Other areas have registered volumetric increases of note. In the Caribbean, Trinidad continued a steady increase, remarkable in the Western Hemisphere. The USSR also showed a gain from 2,577,937 b/d to 2,661,900 b/d, a steady rise which that country has shown over the past few years. In the Middle East, production rose in all the major oil countries. Kuwait rose from 1,383,165 b/d to 1,518,400 b/d. Saudi Arabia broke all her records in the first quarter, and averaged 1,233,078 b/d.

Comparison of major areas underlines the declining importance of the Western Hemisphere as a source of crude oil. It declined from 57% to 56.2%, and will continue to decline in importance. The Eastern Hemisphere gained proportionately. The USA continued its downward trend. The production twins of the Middle East, Kuwait and Saudi Arabia, continued to boost their levels. The principal increase was Africa, which rose to .7% of world production from .3% in 1959. It will continue its increase, rising steadily as new production areas in Libya and Algeria come into the picture.

Table II—Percentage distribution of World Crude production

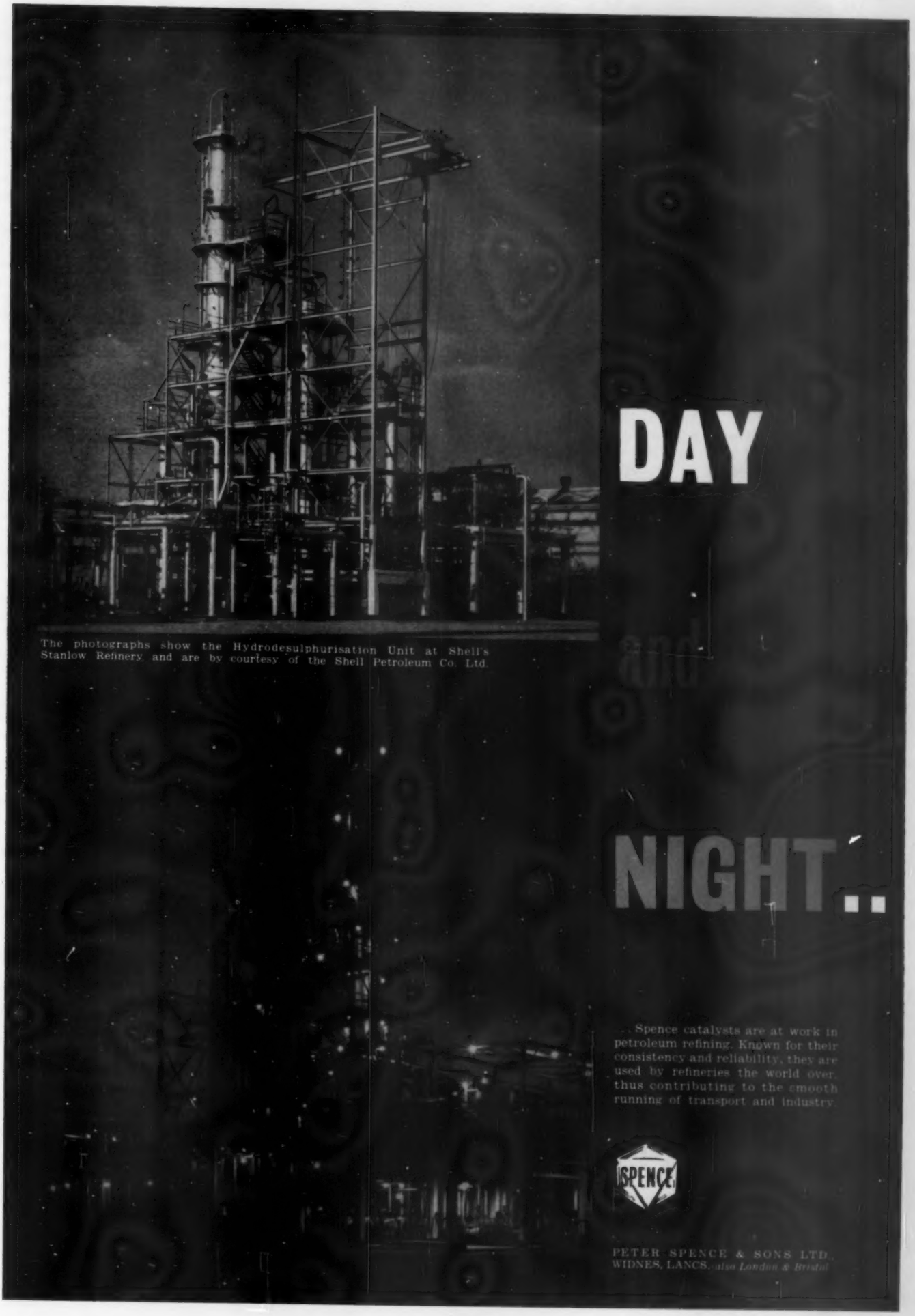
Principal Countries	1959	1960 (1st Qtr.)
United States	36.2	35.4
Venezuela	14.2	14.2
USSR	13.2	13.0
Kuwait	7.1	7.4
Saudi Arabia	5.6	6.0
Iran	4.9	4.9
Iraq	4.4	4.5
Canada	2.6	2.5
Indonesia	1.8	1.7
Mexico	1.4	1.3
Romania	1.2	1.1
Trinidad	.6	.6
Borneo	.5	.5
Argentina	.6	.6
Principal Areas		
North America	40.1	39.2
South America & Caribbean	16.9	16.9
Western Hemisphere	57.0	56.2
Europe (excluding USSR)	1.3	1.3
Middle East	24.0	24.8
Asia & Australasia	1.8	1.7
Eastern Hemisphere	43.0	43.8
USSR & Satellites	14.7	14.4
Africa	.3	.7

Table I—World Crude Oil Production

(Barrels Daily)

Country	First Quarter 1960	Year 1959
United States	7,245,000	7,043,835
Canada	519,000	500,800
Mexico	261,000	264,033
TOTAL NO. AMERICA	8,025,000	7,808,668
Argentina	131,000	122,418
Bolivia	8,850	8,350
Brazil	75,000	64,500
Chile	18,923	17,600
Colombia	144,000	142,500
Cuba	560	525
Ecuador	7,500	7,558
Peru	47,100	48,464
Trinidad	115,100	112,040
Venezuela	2,912,500	2,771,000
TOTAL SO. AMER. & CARIB.	3,460,533	3,294,955
TOTAL WEST. HEMISPHERE	11,485,533	11,103,623
Austria	44,100	45,727
France	34,200	30,093
Germany (West)	104,300	99,664
Italy & Sicily	32,100	31,000
Netherlands	36,050	35,500
United Kingdom	1,700	1,700
Yugoslavia	10,100	10,100
TOTAL WEST. EUROPE	262,550	253,784
Angola	1,100	800
Gabon	14,700	13,967
Morocco	1,990	1,934
Nigeria	12,000	11,000
Sahara (OCRS)	112,000	27,337
TOTAL AFRICA	141,790	55,038
Albania	11,100	11,000
Bulgaria	4,900	4,900
Czechoslovakia	2,700	2,700
Germany (East)	90	90
Hungary	19,400	19,500
Poland	3,600	3,600
Romania	232,500	233,555
USSR	2,661,900	2,577,937
TOTAL USSR & SAT.	2,936,190	2,853,282
Bahrain	45,050	45,133
Egypt	57,000	58,780
Iran	1,002,200*	944,621†
Iraq	910,000	849,327
Israel	1,800	2,500
Kuwait	1,518,400	1,383,165
Neutral Zone	127,000	116,269
Qatar	174,200	173,586
Saudi Arabia	1,233,078	1,095,399
Turkey	7,447	7,241
TOTAL MIDDLE EAST	5,076,175	4,676,021
British Borneo	105,000	104,300
Burma	10,300	10,200
China (Communist)	45,000	40,500
India	9,900	9,800
Indonesia	355,000	345,000
Japan	7,600	7,600
New Guinea	5,100	5,100
New Zealand	20	20
Pakistan	6,400	6,300
Siam (Thailand)	200	200
TOTAL ASIA & AUSTRALASIA	544,520	529,020
TOTAL EAST. HEMISPHERE	8,961,225	8,367,145
WORLD TOTAL	20,446,758	19,470,768

*Includes 5,200 b/d for Naft-i-Shah.
†Includes 5,246 b/d for Naft-i-Shah.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The photographs show the Hydrodesulphurisation Unit at Shell's Stanlow Refinery and are by courtesy of the Shell Petroleum Co. Ltd.

Export Decision Touches Off Gas Boom in Canada

(*Continued from page 50*)

lumbia there was a steady growth by British Columbia Electric Co. Ltd. In Alberta, Canadian Western Natural Gas Co. Ltd. and Northwestern Utilities Ltd. had a normal increase in services installed. Saskatchewan Power Co. enjoyed one of its biggest growth years, adding 12,000 services to its province-wide gas distribution network to a total of 57,000 services.

Natural gas was the salvation of the pipeline construction industry in 1959, as crude oil pipeline building sank to a new low of 227 miles. Natural gas lines, including main transmission lines, laterals and distribution lines accounted for 2,860 miles, of which 1,800 miles were laid in western Canada.

Export markets: The most encouraging development of 1959 in the long deferred plans for natural gas export to the United States was the approval, by the Federal Power Commission, of the export project of Trans-Canada Pipe Lines Ltd. The FPC approved the application of Mid-Western Gas Transmission Co. (subsidiary of Tennessee Gas Transmission Co.) for transmission of 204 mmcf/d across the border at Emerson, Manitoba, to supply Midwestern customers in the north central states of Minnesota and Wisconsin.

Early in 1960 the FPC presiding examiner recommended approval of a small export project by which the St. Lawrence Gas Corp. would export about 8 mmcf/d from eastern Ontario to northern New York state.

Still awaiting decision by the FPC is the biggest of all the export projects: that of Alberta and Southern Gas Co. Ltd. and Westcoast Transmission Co. Ltd. The U.S. applicant is Pacific Gas & Electric Co., which proposes to build a big-inch line from the Canadian border to northern California. Gas will come from the Alberta foothills and be carried to the border by Alberta Trunk Line and a new company Alberta Gas Transmission Co. to be owned jointly by the two export applicants.

Alberta Trunk: The kingpin in all Alberta natural gas production and distribution is The Alberta Gas Trunk Line Co. Ltd., a joint stock company, with much of its share issue in the hands of the public. Two of its directors are appointed by the provincial government, while the other five are elected; three by the gas producers of Alberta and one each by the utility companies and the export pipeline companies.

Up to the end of 1959 Trunk Line had installed capital facilities valued at $55 million. There are 613 miles of installed pipeline in operation, including 66.5 miles of 34-inch main line, 121.3 miles of 30-inch main line, 23.5 miles of 26-inch main line, 141.8 miles of 24-inch main line and 259.9 miles of 4-inch to 18-inch laterals. There are 21 central field collection points and the average daily throughput for January 1960 was 376,691 mcf/d. This was approximately one-third of all the gas produced in Alberta during the month and included all gas moving outside of Alberta.

Trunk Line has a certain amount of mandatory construction to do in 1960. It will consist of 73 miles of 24-inch main line extension and 26.7 miles of 6-inch to 12-inch laterals, as well as a 1,700-foot 24-inch crossing of the Red Deer River which was laid in the winter.

As a result of the Trans-Canada export permit, Trunk Line will add to its 1960 schedule 11.7 miles of 24-inch main line and 107.2 miles of 4-inch to 12-inch laterals. The throughput capacity of the Trunk Line plains division will be increased to 731 mmcf/d providing an ample margin for a few years ahead on Trans-Canada's peak day requirements.

The next expansion stage will be the installation of compressors to the plains division. In 1961 it is planned to add 5,000 hp, while 1962 will bring another 6,600 hp, increasing peak day deliverability to slightly over 1,000 mmcf/d by the fall of 1962.

The foothills division of Trunk Line which has been under consideration for three years has been extended twice on the drawing board as new gas fields have been discovered in the more northerly foothills region. As it stands now, the division will cost an estimated $103 million. It will contain 386 miles of 26-inch to 36-inch main line and 312 miles of 10-inch to 24-inch laterals, a total of 698 miles of pipe.

No compression is planned for the foothills division initially, but an ultimate stage-wise addition of power is planned, as throughput increases, to raise the initial capacity of 620 mmcf/d to over 1,000 mmcf/d. The engineering is purposely being left flexible, especially at the northerly end where field discoveries are still being made, and design will not be frozen until there is assurance of an immediate start of construction.

The company plans to construct roughly half the foothills division in 1960 and the other half in 1961, to commence operations in the fall of 1961 if Washington approval is obtained in time.

Regardless of the exact timing of the construction program, a major difficulty is financing. The last Alberta Trunk bond issue was underwritten at an interest rate of 5¼%. It is estimated now that, with the sharp rise in interest rates during the past year and a half, the bond issue to cover the foothills division construction program may cost upwards of 6¾%.

In any case, if the general approach of dominion government to gas export is favorable, Trunk Line within three years will have throughput capacity of over 2 billion cf/d, making it one of the world's largest gas pipelines in terms of carrying capacity and at the same time one of the most concentrated in terms of the area in which it operates.

British Columbia activity: 1959 demonstrated that as soon as incentive is provided for further gas wildcatting, more discoveries will be made. Northeastern British Columbia, long considered to have more than the average potential of western Canada, had a remarkable discovery ratio of nearly one strike for every two wildcats drilled. Stimulated by increasing demand from Westcoast Transmission, operators in B. C. stepped up their exploratory drilling and opened up at least three new gas discovery areas which may prove to be major fields. The gas play has now spread out all the way from Fort St. John, the original B. C. Discovery field, to the Yukon border 220 miles north. So successful has been the finding of new reserves that Westcoast officials are now planning to lay an entire new pipeline system from the Fort Nelson area, to their terminal at Taylor, near Fort St. John, to provide ample capacity and flexibility for future throughput.

In Ontario, a record year of drilling under the waters of Lake Erie yielded enough discoveries to build up a small gas reserve. Opinion of operators is that drilling will accelerate in 1960. Purchase contracts have already been signed with Union Gas and it is expected that 20 to 25 mmcf/d will soon be on the line. The wellhead price, based on competitive delivered cost of Trans-Canada gas, runs to about 35 cents per mcf, nearly three times the average Alberta field price.

Outlook. By far the biggest stimulation in its 60-year history in western Canada has been given to the natural gas industry. Construction plans run to well over $500 million. The Alberta Trunk program of $103 million for its foothills system is only the start. There will be field gathering systems and development gas wells expected to cost up to $200 million. Processing plants for all the foothills area fields, required because of the high sulfur content of the gas, plus the 106-mile 36-inch joint pipeline to the border, will cost upwards of $200 million. All this is in addition to the $46 million Trans-Canada will spend.

The Canadian Petroleum Association said the export decision was "the best news the industry has received in over a year. It means that a very large program of large diameter pipe line building may now get underway with the coming of good construction weather. It is very significant too for the natural gas producers who, currently, have idle investment of more than $250 million worth in about 1,000 completed but shut-in gas wells in Alberta alone."

With natural gas export as now sanctioned, CPA's general manager John W. Proctor, explained that the next ten years should see an estimated expenditure in Canada by the industry of $6.8 billion in oil and gas development. The overall revenue to Canada and Canadians throughout the 25-year life of the four contracts now endorsed by government action will amount to an estimated $1.85 billion. END

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Excellent illustration of teamwork . . . structural steel by Central Bridge Company and platework by Toronto Iron Works Limited . . . is the fabrication and erection of this reactor-regenerator for British Petroleum Canada Limited refinery at Montreal East. In addition Toronto Iron Works supplied processing vessels and supplied and erected vertical storage tanks through B.P. Canada engineers the Lummus Company.

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Two New Refineries On Stream

(*Continued from page 75*)

with a minimum of bunker and byproducts while keeping investment and operating costs to a minimum.

Consumers' Cooperative Refineries Ltd. at Regina, Sask., has a $2 million Platformer Unifiner in the planning stage.

Phillips Petroleum and Pacific Petroleum expect to complete late this year the following refining facilities at Taylor, B.C., butane-pentane splitters, 2,000 b/d crude distillation unit, 2,500 b/d catalytic cracking unit, and 700 b/d alkylation unit. Contractor is Stearns-Roger Manufacturing Co.

Regent Refining (Canada) Ltd., Port Credit, Ont., aims to complete this September a 5,400 b/d catalytic reformer and conversion of an existing Platformer to a 5,400 b/d desulfurizer, at a cost of $1.5 million.

Shell Oil Co. of Canada Ltd., is holding in abeyance plans for a 20,000 b/d refinery at Bronté, Ont. Possible start of construction is now believed to be 1962.

Wainwright Producers and Refiners Ltd., Wainwright, Alta., is building a new 3,000 b/d thermal cracking unit and a 1,000 b/d Platformer. The construction contractor is Ralph M. Parsons Co.

Refinery projects which were completed since the last Canadian Review issue of WORLD PETROLEUM in May, 1959, include the following:

British American Oil Co. Ltd. completed a $3 million, 3,000 b/d alkylation unit at Clarkson, Ont., engineered by Universal Oil Products Co., built by Procon (Canada). At Calgary, Alta., B-A increased the capacity of its catalytic reforming unit from 2,000 to 3,000 b/d. The contractor was Treco Construction Division of Vitro Engineering Co. At Port Moody, B.C., the company installed a Vapor Recovery Systerms automatic electronic tank gauging system, said to be the first Canadian installation of Varec equipment. The system has performed so well that B-A will put in another one on some 14 storage tanks at the Moose Jaw, Sask., refinery.

British Petroleum's new $30-million, 25,000 b/d refinery near Montreal, built by Lummus Co. of Canada Ltd. is described in detail on p. 51 of this issue.

Canadian Oil Cos. Ltd. added 20,000 b/d of new capacity at Sarnia, Ont., raising total throughput capacity to 50,000 b/d. Included in the Sarnia expansion program were a new $1.5 million Unifiner, an increase in catalytic cracking capacity, a new 150,000 lb/hr steam generation plant, and a crude oil metering station. Cost of the entire project was $8 million.

Canadian Petrofina Ltd., added a $400,000 gas concentration unit (6 million scf/hr) to its Pointe-aux-Trembles, Que., refinery. The engineering was by Universal Oil Products Co., construction by Procon.

Imperial Oil Ltd. increased crude capacity at Sarnia by 17,500 b/d, bringing total capacity up to 94,500 b/d, and also installed a 1,500 b/d alkylation unit. A big, $16 million program at Calgary raised crude capacity to 14,700 b/d, added a 7,000 b/d fluid catalytic cracking unit, a 3,000 b/d Powerformer, treating units for naphtha and middle distillates, CO boiler and water treating unit, and waste disposal facilities. At Winnipeg, Man., Imperial installed a $2.6 million, 650 b/d HF alkylation unit; and at Edmonton, Alta., a new $2.3 million, 1,500 b/d alkylation unit. Principal contractor for the various Imperial projects was Canadian Bechtel Ltd.

Irving Refining Ltd.'s new $45-$50 million, 40,000 b/d plant at St. John, N.B., completed last spring, includes the following process units: two-stage crude distillation, 13,000 b/d fluid catalytic cracking unit, 7,150 b/d catalytic reformer, 5,000 hydrodesulfurizer, 2,500 b/d hydrogen treater, and facilities for producing about 3 mmcf/d of 90% hydrogen. Principal engineers and constructors was Canadian Bechtel Ltd. The hydrogen plant was built by Girdler Construction Division of Chemetron Corp.

Regent Refining (Canada) Ltd. installed a new 100,000 lb/hr steam plant at Port Credit, Ont., engineered by Regent, built by Foster Wheeler Corp.

Shell Oil of Canada Ltd. engineered and installed a $100,000 Solutizer treating unit of 3,500 b/d capacity at North Burnaby, Brit. Columbia.

Sun Oil Co. Ltd. completed a $350,000 visbreaker of 3,300 b/d capacity at Sarnia, Ont., engineered by Sun and built by Catalytic Construction Co.

Texaco Canada Ltd. installed a $1.8 million, 2,000 b/d sulfuric acid alkylation unit and a new vacuum flasher at Montreal East. Engineered by Texaco Inc. and Foster Wheeler Corp., the alkylation unit was built by Foster Wheeler. The vacuum unit was engineered by Texaco Canada. And at Edmonton, the company put in a new naphtha splitter column. END.

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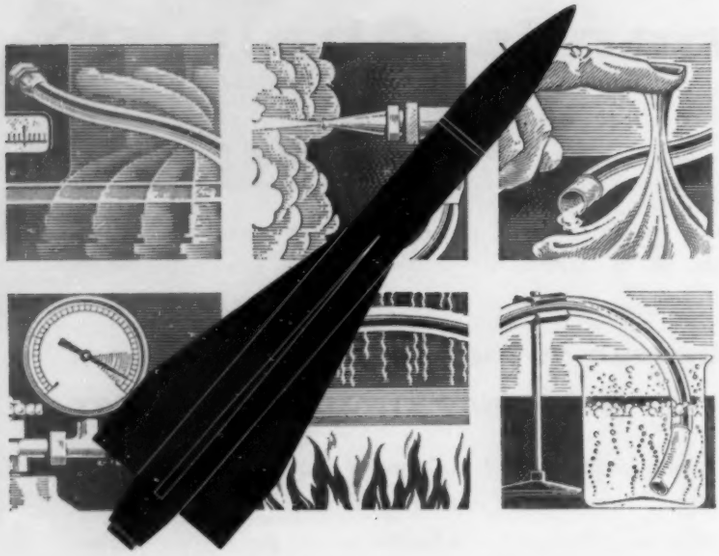

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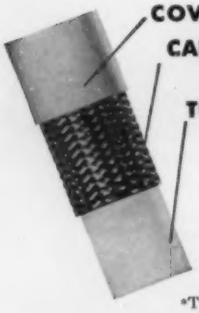

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Gas Plant Building Projects

(*Continued from page 84*)

plant at Rosedale, Alta., to serve the Wayne-Rosedale fields near Drumheller. Completed in November, the plant has a capacity of 7 mmcf/d, and currently is delivering about 600 bbl/month of condensate to Britamoil Pipe Line Co. Ltd., a subsidiary of British American. The contractor was Hudson Engineering (Canada) Ltd.

The known new construction programs are as follows:

British American Oil Co. Ltd. expects to complete by November 1, 1960, a new plant to serve the Dick Lake and Homeglen-Rimbey gas fields of Alberta. Input capacity will be approximately 326 mmcf/d. Output: residue gas, 280 mmcf/d; propane, 68,000 Imp. gal/day; butane, 98,000 Imp. gal/day, pentane, 325,000 Imp. gal/day; and sulfur, 233 long ton/day. The cost is $12.5 million and the contractor is Poole-Pritchard Canadian Ltd.

California Standard Co. will complete late in 1960 a plant to serve the Homeglen-Rimbey field of Alberta, having an input capacity of 120 mmcf/d, and the following output: residue gas, 100 mmcf/d; propane, 130 b/d; butane, 1,000 b/d; natural gasoline, 1,700 b/d; and sulfur, 300 long ton/day. Cost will be $17 million.

Canadian Oils Cos. Ltd. as operator for a group is building a new $4 million plant in the Innisfail field, Alberta. Designed for crude oil processing as well as gas treating and sulfur recovery, the facility will be completed in November of this year. Design capacity will be 10,000 b/d of crude oil; however, the plant is expected to operate at about 7,500 b/d and yield 8.7 mmcf/d of dry gas, 160 b/d of natural gas liquids, and 80 long ton/day of sulfur. Contractor is Brown & Root Ltd.

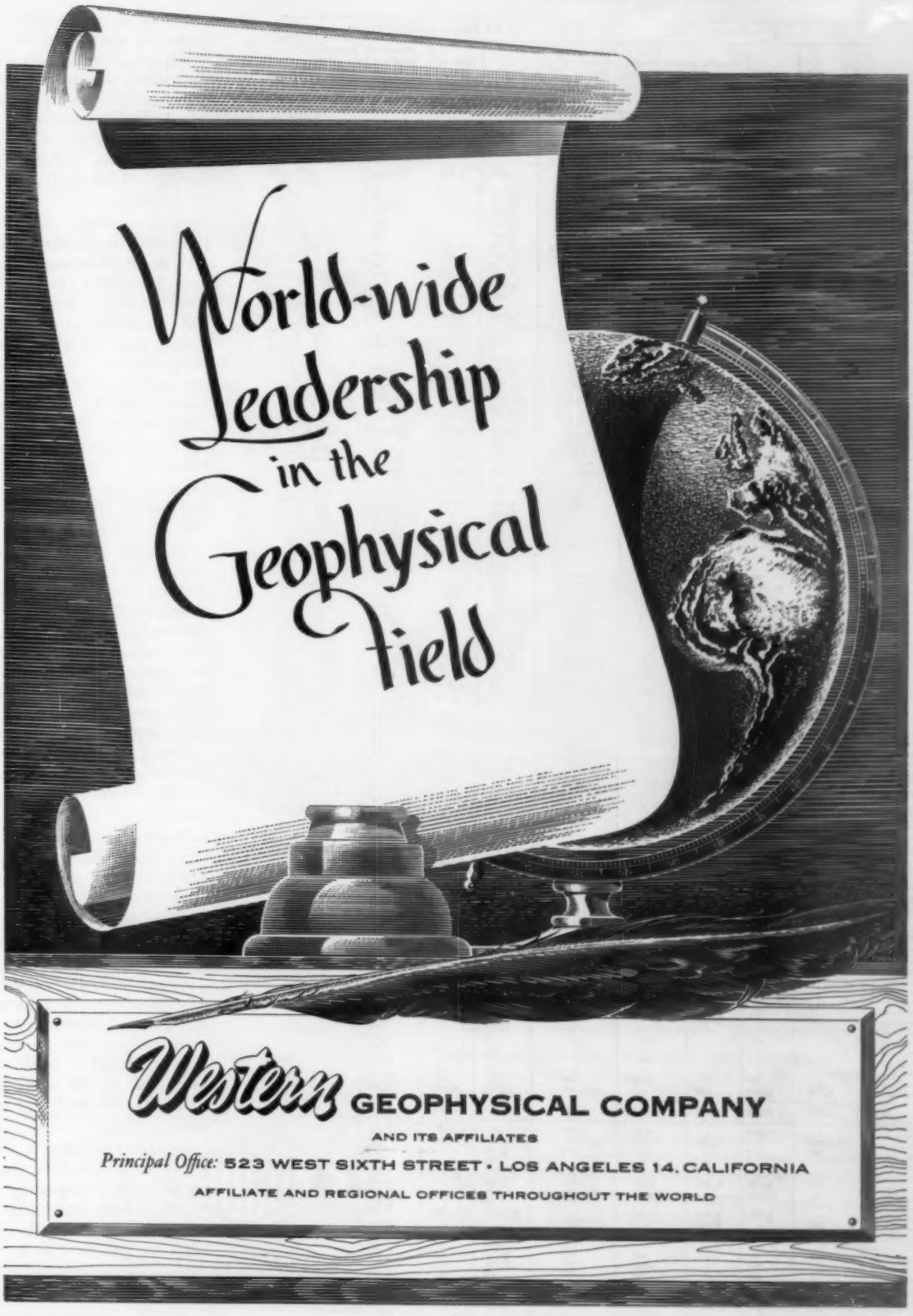
Canadian Pacific Oil & Gas Ltd. spent about $85,000 for a new gas processing plant to serve the Hussar field, about 75 miles east of Calgary, Alta.

Jefferson Lake Petrochemicals of Canada Ltd. has two projects planned. One, a $10 million gas processing and sulfur recovery plant to serve the East Calgary, Alta., field, will have an output of 30 mmcf/d of residue gas, 300 b/d of propane, 400 b/d of butane, 2,000 b/d of natural gasoline, and 350 long ton/day of sulfur. Possible completion, late in 1960.

Another plant at Coleman, Alta., to serve the Savanna Creek field, is planned for completion in 1961, at a cost of $20 million. Its output: 130 mmcf/d of residue gas and 550 long ton/day of sulfur.

Phillips Petroleum and Pacific Petroleums Ltd. are carrying out an expansion program at the McMahon plant at Taylor, B.C., essentially adding a crude oil refining operation.

Provo Gas Producers Ltd., Consort, Alta., in an existing plant that serves the Provost field, is now reaching completion of a $500,000 expansion program to raise the capacity to 100 mmcf/d. Brown & Roote is the contractor. END.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World Petroleum Statistics

FREE WORLD SUPPLY AND DEMAND, CRUDE AND PRODUCTS, AUGUST 1959
(Thousands of barrels)

Source: USA Bureau of Mines, Division of Petroleum.

Country	CRUDE PETROLEUM: Production	Imports	Exports and reexports	Stock change, other demand, and loss	REFINED PRODUCTS: Total 1/ refinery input / Total 2/ refinery output	Imports	Exports and reexports	Apparent domestic demand (incl. bunkers)	Bunkers—all flags (as reported)
NORTH AMERICA									
Canada	13,875	8,573	3,080	-1,506	23,145	4,490	71	3/21,587	
Mexico	8,903	-	-	+ 274	8,467	544	735	8,276	
United States (incl. Alaska)	309,733	29,943	237	-11,069	265,810	16,150	6,658	3/262,156	6,693
Subtotal	333,811	38,516	3,317	-12,301	297,422	21,184	7,504	292,019	
CENTRAL AMERICA AND CARIBBEAN									
Costa Rica	-	-	-	-	-	E/ 95	-	95	
Cuba	17	2,166	-	-165	2,348	E/ 366	-	2,714	
Dominican Republic	-	-	-	-	-	E/ 165	-	165	
El Salvador	-	-	-	-	-	E/ 144	-	144	
Guatemala	-	-	-	-	-	E/ 249	-	249	
Haiti	-	-	-	-	-	E/ 72	-	72	
Jamaica	-	-	-	-	-	457	-	457	
Nicaragua	-	-	-	-	-	E/ 90	-	90	
Panama, Canal Zone	-	-	-	-	-	683	155	528	376
Panama, Republic	-	-	-	-	-	E/175	-	175	
Puerto Rico	-	2,040	-	-227	2,379	288	872	1,795	
Subtotal	17	4,206	-	-392	4,727	2,784	1,027	6,484	
SOUTH AMERICA									
Argentina	3,871	2,987	-	-265	7,123	1,677	-	3/7,551	183
Bolivia	282	-	75	-7	214	8	1	221	
Brazil	2,172	4,367	739	+ 729	5,071	E/1,095	-	6,166	
Chile	561	405	-	+ 188	787	E/599	-	1,382	
Colombia	4,849	-	2,908	-31	2,032	-	390	3/1,606	
Ecuador	232	-	97	-120	255	59	-	314	
Netherlands Antilles	-	19,611	-	+209	19,989	E/1,467	E/16,548	4/4,848	
Paraguay	-	-	-	-	-	E/ 48	-	48	
Peru	1,504	-	174	+519	822	-	13	809	10
Trinidad	3,540	2,519	628	-515	5,998	E/234	4,753	4/1,473	1,118
Uruguay	-	754	-	+4	750	139	-	589	
Venezuela	78,542	-	55,434	-1,700	24,808	E/ 47	21,196	3/3,612	1,224
Subtotal	95,553	30,683	60,055	-989	67,823	5,369	42,901	28,959	
WESTERN EUROPE									
Austria	1,417	338	656	-19	1,158	581	76	3/1,553	
Belgium and Luxembourg	-	4,477	-	+ 286	4,220	1,320	1,473	4,067	
Denmark	-	43	-	+ 19	24	2,643	9	2,658	184
Finland	-	942	-	+342	E/600	317	-	917	
France	1,034	16,794	-	-1,874	19,702	961	4,977	3/13,148	
Germany, West	3,885	10,562	-	+ 533	13,254	3,099	1,823	14,530	
Greece	-	839	-	+ 104	735	194	-	989	
Iceland	-	-	-	-	-	128	-	128	
Ireland	-	795	-	-264	E/969	252	-	1,221	
Italy	1,118	14,693	349	-514	16,035	135	3,109	3/10,319	759
Netherlands	1,053	5,280	-	-275	7,774	2,296	5,244	4,826	588
Norway	-	97	-	+ 23	74	1,334	-	1,408	
Portugal	-	908	-	-319	821	388	90	1,059	
Spain	-	2,698	-	+149	2,596	191	-	2,787	
Sweden	-	1,865	-	+465	E/1,400	3,131	64	4,467	
Switzerland	-	-	-	-	-	1,956	-	1,956	
United Kingdom	49	22,453	-	-98	22,600	8,004	4,159	3/22,715	2,541
Yugoslavia	362	E/400	-	-41	803	E/ 74	E/ 38	839	
Subtotal	8,258	82,644	1,005	-1,483	92,765	27,144	21,062	89,527	
MIDDLE EAST									
Aden	-	2,202	-	-195	2,398	470	1,203	4/1,665	1,745
Bahrain	1,402	4,762	-	+131	6,033	-	4,422	E/1,611	260
Iran	27,524	-	15,867	+1,544	E/10,113	-	8,176	1,937	
Iraq	27,766	-	E/26,740	-	E/1,026	-	-	1,026	
Israel	62	E/758	-	-	E/820	E/859	-	1,679	
Jordan	-	-	-	-	-	E/ 96	-	96	
Kuwait	44,286	-	38,249	+ 1,061	4,916	17	2,766	2,167	1,548
Lebanon	-	E/494	-	-	E/494	22	-	516	
Neutral Zone	3,583	-	E/2,200	+ 733	E/590	-	E/470	120	
Qatar	5,277	-	E/5,261	-	E/ 16	-	-	16	
Saudi Arabia	33,994	-	29,712	-899	5,181	5	3,691	3/1,755	
Turkey	263	-	-	+ 20	223	748	-	971	
U.A.R., Syria	-	-	-	-	-	562	-	562	
Subtotal	144,017	8,216	118,029	+ 2,394	31,810	2,779	20,728	14,121	
AFRICA									
Algeria	567	-	525	+42	-	691	-	3/583	
Angola	29	-	-	-7	36	E/ 87	-	123	
Belgian Congo	-	-	-	-	-	307	-	307	
Canary Islands	-	1,763	-	-67	2,024	46	1,431	639	448
Ethiopia	-	-	-	-	-	E/ 57	-	57	
States formerly in French Equatorial Africa	497	-	E/497	-	-	E/ 78	-	78	
French West Africa	-	-	-	-	-	E/339	-	339	
Ghana	-	-	-	-	-	E/268	-	268	
Kenya	-	-	-	-	-	610	76	534	
Liberia	-	-	-	-	-	E/ 32	-	32	
Madagascar	-	-	-	-	-	E/ 51	-	51	
Morocco	62	-	-	+28	34	348	-	382	
Nigeria	372	-	E/372	-	-	865	-	865	
Rhodesia & Nyasaland	-	-	-	-	-	E/302	-	302	
Sudan	-	-	-	-	-	200	-	200	
Tanganyika	-	-	-	-	-	291	35	256	
Tunisia	-	-	-	-	-	380	-	3/247	
Uganda	-	-	-	-	-	95	17	78	
Union of South Africa	-	649	-	-153	802	1,873	242	2,433	
U.A.R., Egypt	1,186	E/446	132	-	E/1,500	E/630	E/126	2,004	
Subtotal	2,713	2,858	1,526	-157	4,396	7,550	1,927	9,778	
SOUTH ASIA, FAR EAST, AND OCEANIA									
Australia	-	6,239	-	-295	6,548	1,221	188	7,581	607
British Borneo	3,556	-	2,186	-151	E/1,521	E/100	E/1,292	329	
Burma	340	-	-	+61	279	E/ 45	-	324	
Ceylon	-	-	-	-	-	326	-	326	
India	264	E/3,187	-	-	E/3,391	E/1,128	E/274	4,245	
Indonesia	11,382	E/100	4,806	+121	E/6,937	E/358	E/3,119	4,176	E/161
Japan	242	18,686	-	-1,843	12,771	1,184	339	13,616	
Korea, South	-	-	-	-	-	29	-	3/424	
Malaya and Singapore	-	E/585	E/429	+156	-	E/2,508	E/1,586	922	
Netherlands New Guinea	134	-	E/134	-	-	-	-	Insig.	
New Caledonia	-	-	-	-	-	E/ 31	-	31	
New Zealand	-	-	-	-	-	862	-	862	
Pakistan	194	-	-	+6	188	E/717	-	805	
Philippines	-	601	-	-253	854	E/562	-	1,416	
Taiwan	1	320	-	-126	447	549	-	996	
Thailand	-	-	-	-	-	587	-	587	
Vietnam, South (includes Cambodia)	-	-	-	-	-	E/272	-	272	
Subtotal	16,113	21,648	7,635	-2,284	32,936	10,479	6,798	37,012	
WORLD TOTAL EXCLUDING EASTERN EUROPE, U.S.S.R., & MAINLAND CHINA	500,482	188,771	191,567	-15,212	511,879	77,289	101,947	477,900	

E/ Estimate based on latest available data.
1/ Total input includes crude runs to stills plus runs of other unfinished oils, topped crude and natural gas liquids blended.
2/ Total output includes refined product output plus refinery fuel and loss.
3/ Domestic demand as reported, including stock changes.
4/ Apparent domestic demand is heavily influenced by refinery fuel and losses, bunker loadings, and stock changes.

Oil Pipeline Deliveries

(*Continued from page 68*)

primarily at the facilities listed above for increasing capacity of the pipeline system. When completed, the capacity of the various sections will be as follows: Edmonton-Regina, 328,500 b/d; Regina-Cromer, 367,000 b/d; Cromer-Gretna, 428,000 b/d; Gretna-Clearbrook, 434,000 b/d; Clearbrook-Superior, 376,000 b/d; Superior-Sarnia, 333,500 b/d; and Sarnia-Toronto, 121,000 b/d.

Interprovincial's operating revenue in 1959 was $54,220,364, an increase of 10% over the previous year. Operating expenses were $7,978,014, about 8% higher than 1958. A total capital expenditure of $2,667,141 during 1959 was mainly for two electric pumping stations and expansion of other facilities. At the end of 1959, total investment in fixed assets reached approximately $269.6 million, compared with $267.3 million the previous year-end.

Trans Mountain's Operations: Total deliveries for Trans Mountain Oil Pipe Line Co. rose considerably more than originally anticipated. The 1959 total—35,857,162 bbl (98,239 b/d average)—was up 21%.

As shown in Table 3, of the actual increase, British Columbia refineries accounted for 5,447 b/d and Washington refineries account for 11,789 b/d. Favorable exchange arrangements made by some international oil companies contributed materially to this improvement in exports. Two other factors may result in significant developments, although the extent of improvement is not yet clear. One is the easing of USA restrictions on overland imports from Canada, and the other is the possible effects of the Second Borden report.

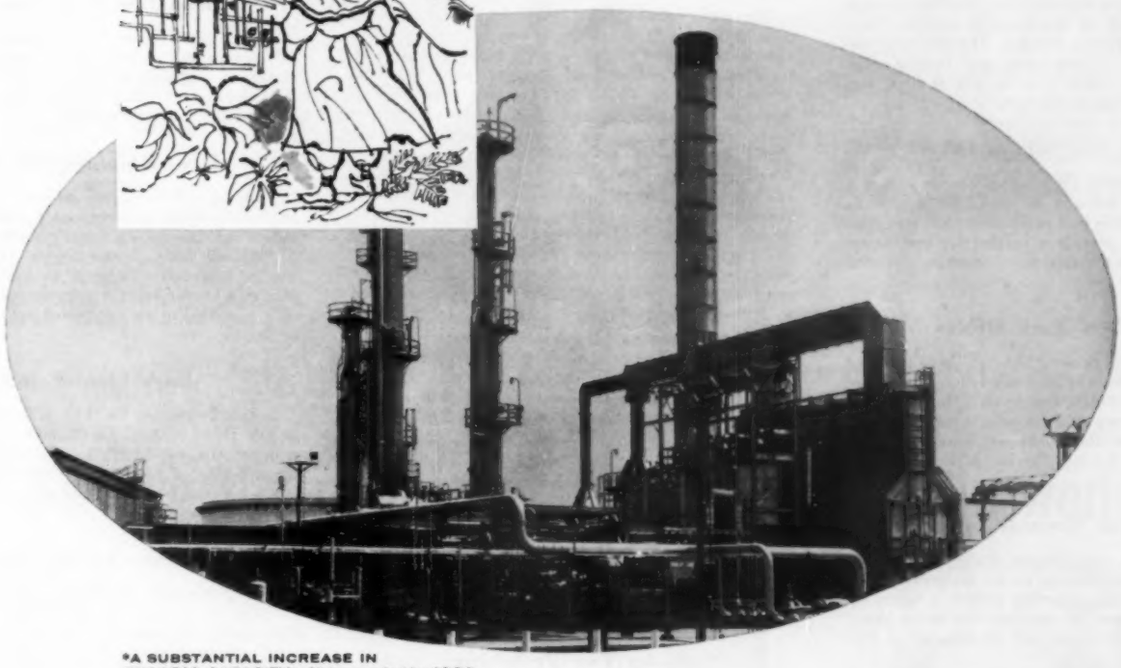
Trans Mountain sees 1960's outlook as very encouraging. Deliveries during the first quarter of this year are indicated at about 124,000 b/d, with approximately the same relationship between British Columbia and Washington refineries as in the past.

Efforts to reduce controllable expenses were fruitful in the improved earnings for the company. Earnings for 1959 after appropriate provision for income taxes were $1,632,323 (21.7¢ a share), which compares with a 1958 loss of $142,798 (1.9¢ a share). A dividend of 15¢ per share was paid.

Capital expenditures in 1959 totalled $346,000 and consisted mainly in relatively minor items of buildings and equipment, better system protection, and improved operation efficiency. The requirements for 1960 are estimated at $100,000.

The company began receiving natural gas condensate in February of this year from the Windfall area in Alberta, at its Edson pumping station. The extension of the Peace River Oil Pipe Line Co. system, scheduled for completion in late 1960, will bring oil from the Peace River area to the Trans Mountain Edison station also. END

*'62 could be the year for you



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INTERNATIONAL NEWS AND NOTES

Tunisian-Italian Pipeline

Italian interests (Soc. Edison and Montecatini) have joined with the Tunisian government to form a company for a submarine pipeline to operate between Tunisia and Italy.

BP To Sell LPG To Japan

British Petroleum Co. has signed an agreement to supply Bridgestone Tire Co., of Tokyo and the leading tire manufacturer in Japan, with "substantial quantities" of LPG from Kuwait. A large recovery plant is now being planned by Kuwait Oil Co. to enable BP to implement this contract.

Enlarging Niarchos Tankers

The Niarchos group's 16,500-dwt turboelectric T2 tankers "World Trophy" and "World Trade" are being converted into 21,600-ton diesel-driven carriers by the insertion of new mid-sections. The first of these was launched recently by Kockums Mekaniska Verkstad at its yard at Malmo, Sweden. The new sections, 355 feet long and 75 feet wide, will lengthen the tankers' hulls from 523 ft 6 in to 572 ft 0 in and broaden them by 7 feet to 75 feet.

France For Sahara Oil

Jean-Marcel Jeanensy, French minister for industry, has promised early decision on plans for a government-controlled refining and marketing company. Aim of the project is to provide a market for two State-controlled exploration companies working in the French Sahara.

Opens New York Offices

Constructors John Brown Ltd. of London, has opened New York offices at 50 Rockefeller Plaza, New York. The company, better known as CJB, is a member of the John Brown (Clydebank) group of companies. This is to be the fourth overseas office, the others being in Teheran, Persia, Melbourne and Perth, Australia.

Ultramar Moves Towards Integration

An important first step towards changing Ultramar Co. from a purely producing to an integrated concern with refining and marketing outlets is taken by a conditional agreement to purchase the entire share capital of Panama Refining and Petrochemical Co. Inc.

This company owns a site in Panama and has a concession on favorable terms to build a refinery with a minimum capacity of 55,000 b/d. Its subsidiary—Golden Eagle Refining Co. Inc.—has two oil terminals, a 9,000 b/d refinery in California with 720,000 barrels storage capacity, 18 gasoline stations, and other facilities. Ultramar is seeking partners to implement the Panama refinery concession and is considering expanding the Californian plant to 30,000 b/d.

Spitzbergen Oil Possibilities

The island of Spitzbergen in the Arctic Circle off the coast of Norway will be visited by Shell International Petroleum geologists this year to collect geological information which may assist in assessing the oil potentialities of the area.

Advance of Oil-Burning Ships

A further advance in the use of oil in the world's merchant shipping is shown in Lloyd's Register of Shipping report for 1959. The share held by oil was 94.0% at July 1959 against 93.1% a year before.

The total gross tonnage of tankers last July was 37,889,684, or 30.3% of world shipping, against 33,590,140 (28.5%) at July 1958.

New Shell-BP Pipeline In Nigeria

African Construction Co. has started work on a new 18-mile, 12-in. pipeline with an ultimate capacity of over 80,000 b/d which will carry crude from all Shell-BP Petroleum Development Co. of Nigeria's oilfields in the Eastern Region to the coast. This final link will run from the Bomu field, 35 miles east of Port Harcourt, to a new ocean terminal at Bonny. For its last 10 miles the line will be laid on the Bonny River bed, where it will be covered by 70 feet of water at its deepest point. Completion is expected in May.

In preparation for this marine outlet, a 14-mile, 12-in. line was completed in December from Bomu to Afam and connected with the earlier Afam-Port Harcourt line at a cost of £250,000. Another £500,000 is being spent on dredging the Bonny River bar in the hope of opening a channel big enough by the end of the year to allow 18,000-ton tankers to pass fully loaded instead of the present limit of 9,000-tonners.

World Fuel Patterns Change

Algerian oil is not likely to upset the petroleum trade pattern through 1965, and during the next five years Middle East exports to Europe will not be affected much, according to the new United Nations study entitled *Economic Survey of Africa Since 1950*.

The study stresses that (1) growth of European oil imports up to 1970 will be at annual rate of 4.6% compounded; (2) France's total consumption is to increase to 26 million tons (520,000 b/d) by 1960, to 35 million by 1965; (3) Europe's absorption of Algerian oil will be without upset to the present oil-trade pattern; (4) large Algerian reserves are the "most significant development in petroleum during the decade under review"; (5) Algerian gas reserves of 300 to 500 billion cubic meters requires study of tanker and pipeline transport to Europe; (6) ratio of private investment in Algerian oil and gas is rising; (7) high gasoline content of Algerian oil poses consumption problems in West Europe, where a gasoline surplus already exists—with France's refineries geared to Midwest high fuel-oil-content crude.

The study portrays Libya as offering more potential competition in European markets than Algeria or the Middle East. Libya's shallow-well discoveries are only 75 to 100 miles from the coast—with depths at Bahi around 5,800 ft and at Dahra from 2,800 ft to 3,800 ft.

BP Takes Sahara Crude

Agreement has been concluded between British Petroleum's French affiliate and SN Repal for deliveries of French Saharen oil over the next three years. Offtake by SFBP for 1960 will be 830,000 tons (about 16,500 b/d); 1,150,000 tons in 1961 (23,000 b/d); 1,400,000 tons in 1962 (28,000 b/d).

Alaska Test Promising

Discovery of a "very promising" new oil field on Al Kenai peninsula has been announced by Standard of California and Richfield Oil Corp. Wildcat well SCU 41-4, on the 72,000 acre Soldotna Creek lease, produced on test at the rate of 1,870 b/d for a brief period through a ½-in. choke. Production is from a 230-ft sand section. Drilled to a total depth of 11,315 ft, with 7-in. casing cemented at 10,992 ft, additional tests are being made in the interval between 10,228 ft and 10,585 ft in the hemlock zone.

Sirip Discovers Iran Oil

Discovery of oil has been confirmed by the Italian company Sirip (Agip Mineraria-NIOC) in its Khorramshah permit offshore Iran in the Persian Gulf. Initial flow of Sirip No. 1 wildcat was 3,500 b/d from a depth of 2,300 meters.

RAP To Search In Greece

France's government-controlled exploring companies have been extending their drive to search for oil outside French territory. Latest move is to Greece. RAP (Regie Autonone des Petroles) has been negotiating for a 50% investment in a joint venture in eastern Thrace with Ilios, a private Greek company which has been searching there for some time. RAP, the operator, will invest a minimum $950,000 during a four-year period.

Europe's Energy Policy

A report by French, German, Belgian, and Dutch coal producers, entitled "A Coordinated Energy Policy," demands application of identical rules to coal, oil, and natural gas to insure competition in the six Common Market countries of Europe. The unified energy policy would call for (1) import duties for crude and products into the six-nation group; (2) heavier taxes on residuals and lighter taxes on gasoline; (3) import quotas for crude and products. Aim is elimination of "distortions" in European coal vis-a-vis imported coal, oil and gas.

ICI To Make Polythene In Denmark

Danbritkem SA has been formed in Denmark for the manufacture of polyolefins with a capital of 80 million kroner (about £4 million), provided equally by the two partners, Imperial Chemical Industries, Ltd. and A/S Dampskibsselskabet Svendborg and Dampskibsselskabetaf 1912 A/S. The Danish companies own the Maetsk refinery, Copenhagen, where initially it is planned to build a 15,000 ton/year plant to make "Alkathene," the brand developed by ICI using its high-pressure process. Danbritkem represents the first venture in which ICI has undertaken joint manufature of polythene in Europe.

Iran Has Huge Gas Field

Proved gas reserves on the Sarajeh structure, about 100 miles south of Teheran, are estimated by NIOC's chairman Abdollah Entezam at more than seven trillion cubic feet. This would rank Sarajeh as the world's fifth largest gas field.

Japan Doubles Gas Supply

Teikoku Oil Co.'s new gasser, No. 16 Katamachi in Kubiki field, is now under control after having blown out twice since discovery. With a potential of 35,000 mcf daily, it can double Japan's gas supply; but is currently restricted to 2,500 mcf daily for Niigata's local market. Under way is a $6 million 100-mile pipeline, to be completed in 1960, to carry gas to Toyama.

Buys Finnish Interest

British Petroleum Co. Ltd. is buying a half interest in OY Petko A/B of Helsingfors, Finland. The latter will be renamed BP/Petko OY thus introducing the brand name of BP for the first time on the Finnish market. Petko have for some years been BP's bunkering agents in Finland.

Burma To Get Control

The government of Burma may exercise its option to increase its share in the Burma Oil Co. (1954) Ltd.—to 51% from its current 33/3%. This would give it control of the joint venture with Burma Oil Co. and two other British companies.

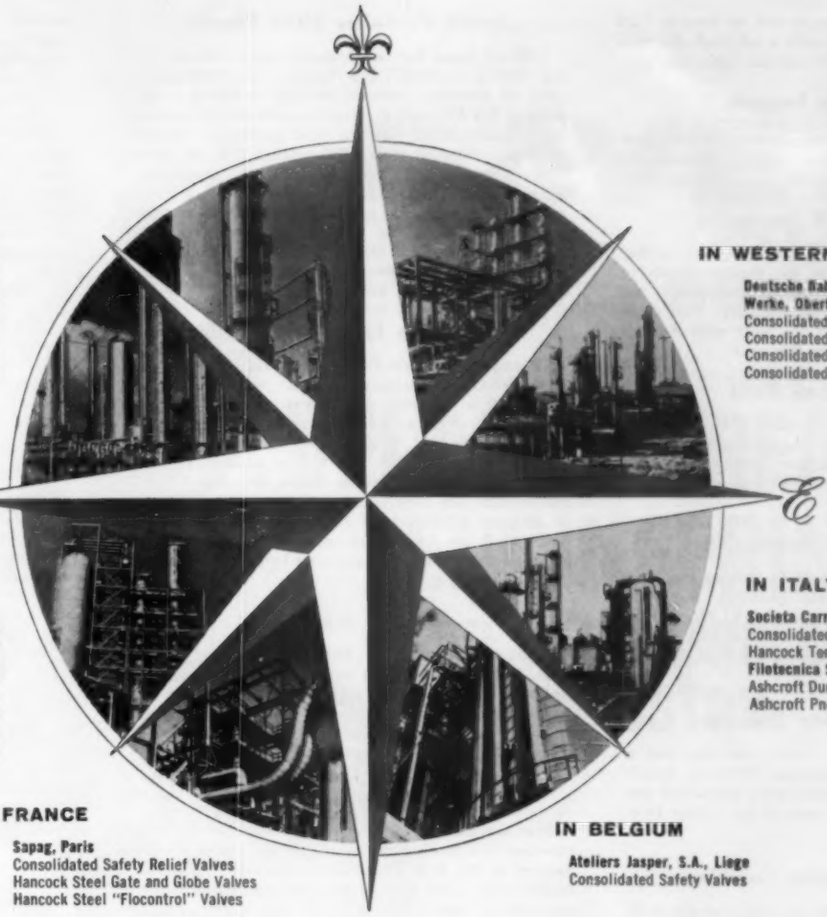
Texaco's Switch To Trinidad

Paragon Oil Co. (Texaco's large USA East Coast subsidiary acquired last year) will now obtain its fueloil supply from Trinidad where the parent Texaco is stepping up its refining of Middle East crude—primarily from the Safaniya field. Paragon until recently had been obtaining 30,000 b/d to 35,000 b/d of products from the Mexican government's oil agency, Pemex. Texaco during 1960 expects to ship 60,000 b/d of Mideast crude to Trinidad to cover Paragon's fueloil requirements. Aramco has scheduled a Safaniya crude output in the same period of 141,000 b/d—currently running considerably higher. With completion of Texaco's expansion program, its Trinidad refinery should become one of the world's largest.

French Saharan Gas Line

Mapping has started on the route of the natural gas pipeline to the Algerian coast from Hassi R'Mel. Work began, February 15, at Saint-Leu, near Oran; and laying of the pipe is due to start soon. The first link of the Saint-Leu-Triaret line will be 110 miles long. The second link, Triaret-Hassi R'Mel, which was started in March, will be 205 miles. The line is scheduled to be completed from Hassi R'Mel to Saint-Leu by the end of 1960. Official opening is scheduled for April 1961. At that time, the Ste. EGA (Electricité et Gaz d'Algérie) will have laid branch lines to bring gas to the Algiers region. The Bone area will be served at a later date.

The Hassi R'Mel-Saint Leu natural-gas line has a diameter of 23.62 in. to Relizane and 19.685 in. from



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Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves

IN WESTERN GERMANY

Deutsche Babcock & Wilcox Dampfkessel-Werke, Oberhausen (Rheinl)
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves

IN CANADA

Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario
Ashcroft Gauges
Consolidated Safety and Safety Relief Valves
Hancock Bronze and Steel Valves
American Bi-Metal Thermometers
American Temperature Regulators

IN ITALY

Societa Carra o & Co., Milan
Consolidated Safety Valves
Hancock Temperature Regulators
Filotecnica Salmoiraghi—SPA, Milan
Ashcroft Duragauges
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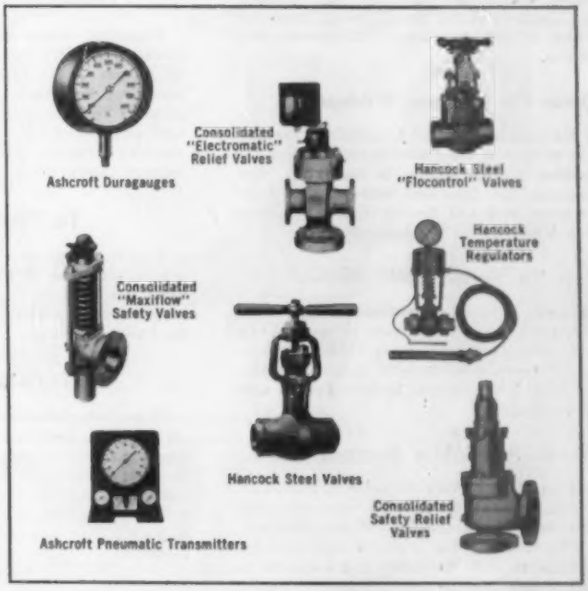

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Relizane to Saint-Leu. Capacity will be four to 5.25 billion cubic meters per year with a full load. Algerian needs presently are about 650 million cubic meters.

Stops Crude Imports

YPF in Argentina has stopped imports of crude from British Petroleum, its chief supplier. Instead, BP now is to bring in an unspecified volume of products.

Indian Oil Well Successful

Oil has been encountered in the fifth well drilled in India's Gambay region at the shallow depth of 1,550 meters (5,095 ft). With Soviet assistance, the well has been drilling since mid-January. Two more wells with Romanian aid and one more with Russian assistance are to be drilled in this area.

Extends Libyan Field

A two-hour open-flow test around 3,744 ft yielded 660 b/d of 36.4-gravity oil at the five-mile extension of Caltex's Beda No. 1 discovery which had been completed for 3,650 b/d. Beda No. 2 is now shut in; and Beda No. 3 is drilling.

To Tax German Heating Oils

To raise a $235 million subsidy during the next three years on behalf of coal operators, the West German government levied a tax of $7.14 per ton on heavy and $2.40 per ton on light heating oils in April. The tax may be increased by 150% if the government deems necessary.

Reports Indonesian Discovery

Texaco has reported that Caltex last year had a "significant" discovery in Sumatra. With no details given, the wildcat is said to have been completed last June at Pematang, 9.9 miles west of the Caltex Duri field.

West German Giants Combine

Merger of two West German oil and coal giants is planned by Deutsche Erdoel AG (DEA), of Hamburg, and Rheinpreussen AG (controlled by the Haniel family). DEA's activities are predominantly in oil production (over 18,000 b/d in 1958) and processing; but DEA also has a Ruhr mine which produces some 3.7 million tons of coal annually. Rheinpreussen has an annual coal production of some five million tons, processing its own raw chemicals; and, together with another company of the Haniel group, owns the marketing firm of Rheinpreussen GmbH with 800 gasoline stations.

Quits On Papuan Wildcat

Standard Vacuum has decided to withdraw from its latest Papuan wildcat at Iehi, after having spent more than $70 million without success in Australian New Guinea. However, the Iehi well will be drilled by British Petroleum and Oil Search Ltd. (Stanvac's associates), each putting up $1.8 million.

French To Spend $495 Million

The government's Bureau de Recherches de Petrole says the French oil industry will have to spend $495 million on its various projects during 1960. Expenditures during 1959 amounted to $491 million, up $51 million over 1958. These figures include France and her overseas territories.

Libyan Subsidiary Formed

Opening of an office in Tripoli and registration of a subsidiary firm to serve oil and gas concessionaries in Libya have been announced by Williams Brothers Co., Tulsa. The company has been commissioned by Tennessee Argentina, S.A. to design and fabricate a portable pilot testing topping unit for use in Tierra del Fuego.

Williams Brothers also has two contracts in Venezuela, one of which is for construction of 15.2 kilometers of 16-inch natural gas pipeline from Caracas north through the mountains to the coast for Venezuelan Atlantic Transmission Corp. The other is a contract with Instituto Venezolano de Petroquimica to perform the hydrostatic test on approximately 138 kilometers of 20-inch natural gas pipeline from Caracas to Valencia.

Brazil Publishes 1959 Figures

Official figure for crude production in Brazil during 1959 is 23,589,872 bbl (64,630 b/d), representing 28% of domestic consumption and a saving in imports of US $70 million. Rigs operating as of year-end 1959 numbered 62 (56 the year previous). Number of wells drilled during 1959 totaled 299, of which 129 are producers (1958; 139 drilled, 81 producers). Footage drilled in 1959 totaled 937,056 ft (679,805 in 1958). Natural-gas production increased by 30% between 1958-59, to 428,560,612 cubic meters. National oil-product consumption was 224,000 b/d during 1959—expenditures on oil imports dropping to $253 million from $281 million.

Natural-Gas Line for Colombia

Colombia Petroleum Co. (50% Mobil International, 50% private Colombian interests) will build a $7 million 10-in. 140-mile natural-gas pipeline terminating at the Caribbean port of Barranquilla. For completion late in 1961, it will deliver initially 20 million cubic feet per day. The line will be Colombia's first, and marks the first time in South America a USA oil company will have joined with local private capital to develop a natural-gas line. Colombia Petroleum will supply gas from wells in the Cicuco field. The project will be built and operated by Gases Naturales de Colombia S.A.

LPG In Argentina

Souto y Compania, an Argentine firm, has a contract with the State gas agency for distribution of propane and butane in rural and urban areas not served by a natural-gas pipeline. A large supply of LPG is due to become available in 1959 with completion of the oil pipeline from Campo Duran.

Brazil Pipeline Studied

Brazilian officials are studying 11 bids for the construction of a crude pipeline of 298 miles from Rio de Janeiro to the Belo Horizonte area. The line would supply crude for a new refinery proposed for the area, probably at Sant Luzia. A 12-in. line is proposed.

Plan Bolivian Test

As part of their joint exploration program, Shell and Standard of California plan their first wildcat in Zone 1 of Santa Cruz province, south-central Bolivia.

Colombia Oil Use Up 3.7%

Excluding international bunkers, demand for oil products in 1959 totaled 17,312,000 bbl, a gain of 3.7% over the 16,697,000 bbl in 1958. The increase was more than that of the 0.4% and 0.5% in the previous two years, but well below the average annual increase of 15% in the years before 1956. The austerity program and prohibition of passenger-car imports caused demand to level out.

To Process Bitumens

Russian technicians under contract to Petrobras are investigating the possibilities of building a plant in Brazil similar to one in Leningrad for the processing of bituminous schists. The new plant would replace the existing pilot plant.

Price Policy In Venezuela

Juan Perez Alfonzo, minister of mines and hydrocarbons, has announced he will talk with the three American oil companies which sold Venezuelan crude at prices between $1.50 and $2.00 to Interamerican Corp. Such sales "endanger" Venezuela's policy of maintaining prices, said Alfonzo. Present posted price is $2.50. The three companies produce Maracaibo crude.

India To Study Oil Needs

A 15-member joint government-oil industry refining and marketing committee has been appointed, headed by India's minister of mines and oil K. D. Malaviya. Officials of Burmah-Shell, Standard Vacuum, Caltex, Assam, Western India Oil are among the members.

Duties of the committee include preparation of annual estimates of consumption of various oil products, estimates of required refinery production and imports; recommendations for fullest use of India's tankers, and estimated rail car needs; and possible construction of product pipelines to relieve railways on sections were oil traffic may be too heavy.

Petrofina To Buy New Superior

Canadian Petrofina Ltd. has made an offer to purchase all the assets of New Superior Oils of Canada, Ltd. in exchange for Petrofina Participating Preferred Shares. E. A. Calvin, president of New Superior, confirmed that the directors of New Superior had approved the purchase offer for submission to the vote of shareholders.

Hassi Messaoud's First Million

The loading on February 23, at Bougie in Algeria, onto the "Dalila" tanker of the Cie. Auxiliaire de Navigation, brought to one million tons (seven million barrels) the quantity of crude oil loaded at that port—all of it from the Hassi Messaoud-Bougie pipeline.

United Fruit In Oil

United Fruit Co. has acquired a 123,000-acre oil concession in Colombia. Eight test wells have been drilled and extensive seismic surveys conducted. Seven wells presently are considered producers. Field measurements of initial production range from 100 to 760 b/d per well. Lack of gathering and storage facilities has prevented measurement of full capacity under sustained production.

Unfair French Competition

International oil companies with French affiliates are protesting they are being discriminated against marketwise when the French government does not force its own Cie. Francaise des Petroles to buy extra Sahara crude. So far, CFP has refused to take any more than its own Sahara production on the ground it also handles the French share of Iraq production.

Lebanon's Third Test

The third test ever to be drilled in Lebanon will be during mid-1960 by Gewerkschaft Elwerath which acquired a half-interest in Cie. Libanaise des Petroles. The first of two 6,500-ft test to be drilled by the German firm before year-end 1961, the well will be located in northeastern Lebanon, just north of Ras Baalbek.

80,000 B/D Nigerian Crude Line

A 12-in. 80,000 b/d (ultimate capacity) 18-mile pipeline, being constructed by African Construction for Shell-BP Petroleum Development Co. of Nigeria Ltd., will carry crude directly to the coast from all the company's eastern Nigerian fields—from Bomu field, 35 miles east of Port Harcourt, to a new ocean tanker terminal at the mouth of the Bonny River. The line is slated for May 1960 completion.

Gives Up In East Africa

After six years of failure and its fourth dry hole, Standard Vacuum has decided to give up in the Somaliland. On the company's 11,000-square-mile concession bordering the Gulf of Aden, Biyo Dader wildcat No. 1 went to 4,850 ft—to about the same depth as three earlier dry holes at Dagah Shabel.

Libya Has Big Oil Find

Oasis Oil Co.'s No. B1-59, the company's new discovery now under extensive test, bids fair to become a major find. Located on a large block of Oasis acreage, south of Esso's zelten field, it may be the company's best Libyan well, although Oasis has not yet announced the discovery's potential.

Capital for National Company

A special budget to the Venezuela congress appropriates 2.5 million bolivars ($750,000) as the initial capital for a proposed national oil company.

More Spanish Sahara Rights

To the long list of American companies recently granted exploration rights in the Spanish Sahara may be added Union Oil, Hispanic Sun, Champlin, General American, Tidewater, Standard of Ohio, and Pan American. Union Oil obtained three blocks;

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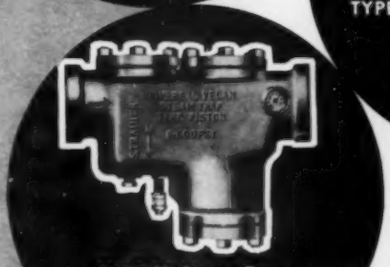

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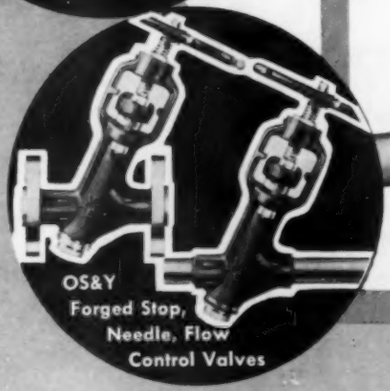

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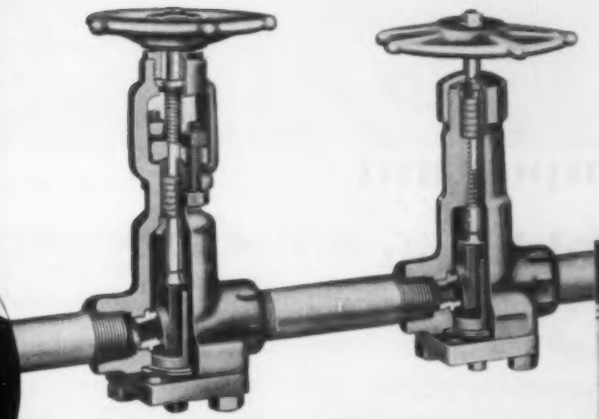

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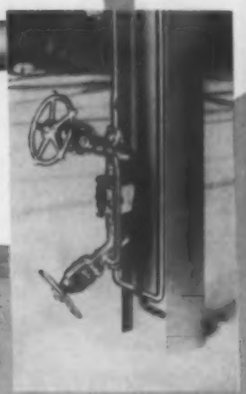

Here is a typical hook up with Velan Piping King.

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WRITE TO VELAN COMPANIES IN **BEEKMANTOWN ROAD, PLATTSBURGH,**
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Hispanic Sun and Champlin each one. In addition, Gulf has obtained seven exploration concessions on the Spanish mainland (besides its Spanish Sahara rights). Total investment for the 12 blocks awarded is $28.7 million.

Oil Activity In Switzerland Up

An exploitation concession has been received in Zurich Canton by SEAG (Ste. Anon. du Pétrole en Suisse). In its first stages it called for seismic exploration, now already completed. Several structures for possible oil accumulations have been noted, and the first well is planned for the vicinity of Limberg town, in the commune of Kuesnacht. Additional wells are planned thereafter in Zurich and Argovie Cantons.

Syrian Reserves Estimated

The General Petroleum Authority has estimated oil reserves in the Syrian region at 130 million tons. The four wells already drilled in the Karatchok field (for which 10 million Syrian pounds had been budgeted for 1959-60) have a total producing capacity of 2,990 b/d.

German Projects For Syria

A delegation headed by Hermann Reinhardt, director of West German Foreign Trade, has proposed to the Syrian government projects totaling 266,160,000 Syrian pounds for oil exploration, refining, and transportation. Syrian officials look for self-sufficiency by 1967 in crude oil, with a 10,000 b/d surplus worth 25 million pounds.

Queensland Strikes Gas

A drill-stem test at a well in the Roma district of Queensland, Australia, has resulted in gas production at the rate of 1.25 milion cubic feet per day, according to annoucement of Australian Oil Fields Ltd.

Russians Aid Indian Wells

Before it would anounce an estimate of Gambay's oil reserves, the Indian government reported plans to drill four more test wells on the periphery of Cambay's oil basin. Russians will assist on test wells No. 5 and 6, and Romanians on wells No. 7 and 8. Indians are reported to have struck oil (with considerable pressure) in well No. 4 at 4,925 ft., shallowest depth so far at Cambay.

Offshore Rig In Neutral Zone

A second drilling platform is due in May offshore the Saudi Arabia-Kuwait Neutral Zone on the concession of Arabian Oil Co. A second well was started February 15.

President Taru Yamashita said that any commercial production will be marketed in Japan; that it would have first priority over all other oil for a market.

Germans To Assist In India

India has accepted West Germany's offer of personnel and equipment for exploration. For one year, a geophysical team will carry out seismic surveys in the Gangetic plains. Entire cost will be borne by the Germans except labor and operational expenses, which will be covered by India's Oil and Natural Gas Commission.

To Start Sahara Exploration

Tidewater Oil Co. will begin exploration immediately, as operator for itself and Standard Oil Co. of Ohio, on five million acres in the Spanish Sahara. Base of operations will be in Las Palmas in the Canary Islands, about 120 miles off the Spanish Sahara coast. The two companies recently obtained a joint concession from the Spanish government, as well as a joint license near the city of Seville in Spain.

Adds Australian Acreage

Texas Australian Exploration Ltd. has acquired an additional 3,200,000-acre oil and gas concession in New South Wales. Acquisition brings total net acreage acquired by the company in Australia to 6,400,000 plus application on an additional, 6,400,000 acres in the Northern Territory.

Shell Gets Pakistan Rights

A three-year oil exploration license has been granted Pakistan Shell Oil Co. Ltd. in the Muzaffargarh area. The 4,790 square miles are located in the district of Shahpur of Rawalpindi division, district of Mian Wali in the Dera Ismal Khan division; Multan and Jhang of the Multan division; and Muzaffargarh in the Bahawalpur division.

French Africa Exploration

An airborne magnetic survey has begun in Chad, French Equatorial Africa, by the French government's Bureau de Réchérches des Pétroles. With an Hurel Dubois HD-34 plane, geophysicists are studying the depth of sediments covering the Chad and Niger republics. The group is based at Fort Lamy and Largeau, and it will be especially concerned with the region of Lake Chad, and of the Bahr El-Gazal region up to the Libyan border.

To Act On M.E. Oil Projects

An Arab League Economic Council spokesman said in Cairo that the council (which previously had agreed to establishment of an Arab-owned pipeline company) also is studying projects for (1) an Arab oil tanker company; (2) an economic development fund; (3) setting aside 5% of all oil revenues for development in nonoil-producing Arab countries. Delegate Fakhir Kayyali has announced UAR will sign agreements for unified Arab oil policy and pipeline company before council's next meeting, May 15.

An Important Addition

The new BP Canada refinery at Ville d'Anjou near Montreal is an important addition to Canada's growing petroleum industry. High quality products from this refinery will assist in keeping pace with rising Canadian demand.

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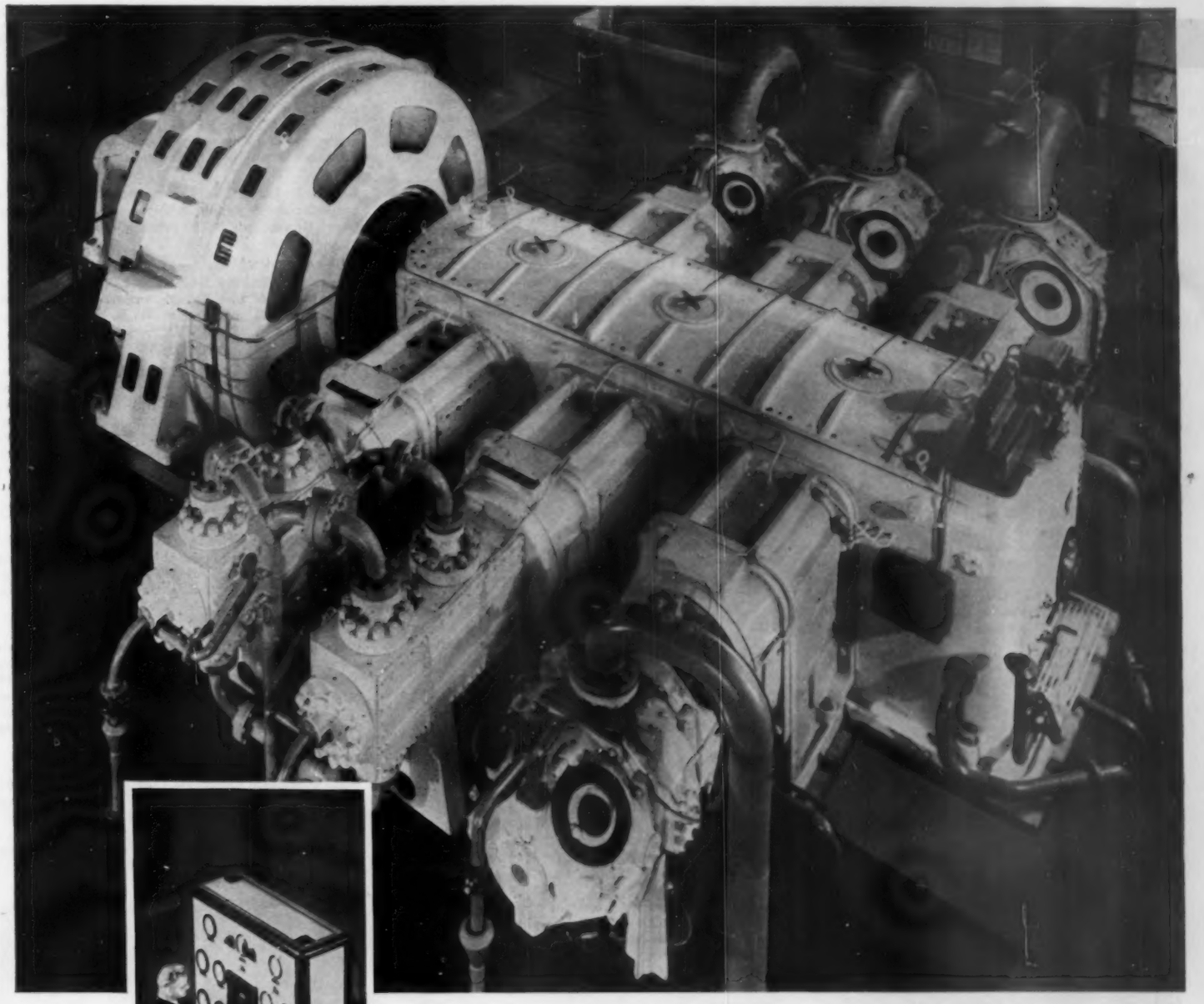

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OIL COMPANY STAFF CHANGES

H. O'Neill

B. A. Warren

HAYLETT O'NEILL, JR. has succeeded A. J. Kelly as general manager of the purchasing department of Humble Oil & Refining Company's Esso Standard division. Mr. Kelly retired March 1 after 41 years with Esso. Mr. O'Neill transfers to New York from Houston, Texas, where he has been purchasing agent of the Humble division. His successor at Houston, will be **B. A. WARREN**, who has been assistant general manager of Esso Standard's purchasing activities.

GEORGE J. WEBSTER has been elected president and general manager of United Carbon France S.A., the United Carbon Company French subsidiary. **JOHN BAHM**, international sales manager for United Carbon Company, Inc., was also made a vice president. **R. W. FRENCH, HENRI de ROUBIN, A. G. TREADGOLD** and **H. B. LAWSON** were appointed directors of this newly created foreign subsidiary.

United Carbon France S.A. has begun initial plans to build a 50 million pound carbon black plant in northern France, just outside of Rouen.

THOMAS D. DURRANCE has been appointed public relations manager in the Middle East for Arabian American Oil Co. He had been director of public relations for Texaco Inc. since September, 1957. Before joining Texaco in 1955, he was Associate Editor of "Barron's Business and Financial Weekly."

HENRY H. BEESON has been named to the newly created position of natural gas coordinator for company operations throughout the United States. His office will be in Dallas. Mr. Beeson first joined Mobil in 1946 as assistant manager of Magnolia Petroleum Company's Natural Gas Department. He was made manager in April, 1959.

J. A. LESTER has been named general manger of a geophysical services group at Dallas for Mobil Oil Co.

R. E. HORN was made superintendent of geophysical field operations, **M. D. McCARTY**, superintendent of engineering and maintenance, and **A. W. MUSGRAVE**, superintendent of the special problems.

DAVID K. TAYLOR has been appointed manager of Mobil Producing Tunisia, Inc. Mobil International Oil Co. also named four senior people to SEREPT, an oil company with which Mobil has entered a joint exploration venture in Tunisia. The men and their new positions are: **EDWIN F. HELSER**, exploration manager; **DONALD W. MacLEAN**, senior geologist; **JAMES R. FASBENDER**, assistant chief geophysicist, and **JOHN F. SCHLEINICH**, chief seismic interpreter.

SEREPT is owned jointly by French and Tunisian private and government capital. Mobil Exploration Tunisia recently concluded an agreement with SEREPT to jointly explore the acreage in southern Tunisia between the French Sahara and Libya on which SEREPT holds rights and has been working for several years.

CHESTER M. HARDEN, who has been drilling and production superintendent for the Pure-Signal-Sohio group in Venezuela, will become manager of production with headquarters in Chicago. **JAMES R. McCHESNEY** will remain as manager of the gas department and **FLOYD L. STEWART** as chief production engineer.

RAYMOND H. RANTALA of the geological staff will become manager of exploitation with responsibility for evaluation studies of production and reserves.

HOMER J. STINSON has been appointed to production superintendent in charge of operations on the Gulf Coast for Ada Oil Co., Houston. He has been serving as petroleum enginerr.

FRANK H. YURASKO has been named a project manager in the engineering coordination unit of Esso Research and Engineering Co. He has been an assistant director in the company's construction engineering division.

ENRICO MATTEI has been re-elected president of ENI by the board of that state organization. His term of office will run until 1963.

WILFRED C. HUGLI, Jr., has been named manager of operations research for Cities Service Oil Co (Pa.). He has been engaged in research activities for 20 years, and has been a consultant to a number of major corporations.

DAVID L. EYNON, Jr., has been elected chairman and **JOHN A. SCOTT** president of the newly formed Sinclair-Koppers Chemical Co., in Pittsburgh. The new corporation is jointly owned by Sinclair Oil Corp. and Koppers Co., Inc.

JOHN H. DOUMA, vice president and general manager of Sunray Mid-Continent Oil Co.'s west coast division, Los Angeles, will head a new Western division as vice president and manager at Denver. **O. A. GRAYBEAL**, Sunray's West Coast division production manager, has been named to the same position in the Western division. **T. A. CLOTE**, Denver, Sunray's Rocky Mountain division exploration manager, has been named as division exploration manager of the consolidated division.

J. BYRON ECKERT has been appointed middle east regional executive, marketing and manufacturing, with offices in New York for Mobil International Oil Co. He was general manager of Mobil Oil Egypt (S.A.) and Socony-Vacuum Oil Company of Syria. He is succeeded by **NIXON L. BALLARD** who was president and general manager of Mobil Oil Lebanon, Inc. in Beirut. **EDWARD J. HYMAS** has been appointed to release Mr. Balard in Lebanon.

STEWART CRONIN, exploration manager of Pure Oil Co will transfer to Calgary, Alberta, to take charge of Pure's activities in Canada and Alaska about June 1. **KARL A. MYGDAL**, geological representative in Calgary, will transfer to the company's new Northern producing division headquarters in Denver.

JOSEPH P. LaCROIX will become manager of services, supervising divisional accounting budgets, personnel, and materials matters. He has been assistant to the vice president for production.

FRED A. DEVIN of the Rocky Mountain producing division will transfer to Chicago as exploration manager. Assisting him will be **JOHN H. MAHER** as chief stratigrapher and **J. LEE DAVIS** as chief geophysicist.

ARNOLD F. KAULAKIS has been appointed acting general manager of engineering at the Esso Research and Engineering Co., it was announced at the weekend. He will be responsible for the company's 800-man engineering force which provides complete engineering support for the world-wide petroleum refining and petrochemical operations of Standard Oil Co. (New Jersey).

H. D. MOORE has been appointed president of the Derby Refining Co. division of Colorado Oil and Gas Corp. He is resigning as vice president and executive assistant to the president of Sinclair Oil Corp. With Sinclair, Mr. Moore held various positions in the refining and marketing departments and before that was an executive of Wood River Oil and Refining Company at Wichita. For 16 years prior to that Mr. Moore was with the Oil Division of the W. T. Waggoner interests at Vernon, Texas.

H. FRANK BROWN has been named manager of Shell Oil Company's public relations department. He was manager of Shell's visual aids division.

C. F. McCOY, vice president and administrative coordinator for Sinclair Oil & Gas Co, Tulsa, has been elected a director. He was vice president and a director of Sinclair Pipe Line Co., before joining Sinclair Oil & Gas last September.

EARL J. JAMES has been appointed purchasing agent for the Beaumont Refinery of Mobil Oil Company, He succeeds W. B. Johnson, who is retiring.

ROY A. PAYNE has been appointed district manager at New Orleans for Gulf Oil Corp. Under him, as managers of the district's various functions, are: **H. D. RITTER**, explorations; **W. B. HOPKINS**, production; and **J. A. AUSTIN**, services.

VERNER JONES has been named for a special one-year assignment as exploration manager for Mobil Oil of Canada, Ltd. (Libyan Branch) in Tripoli, Libya. Following the completion of this special assignment he will again become exploration manager in the corporate exploration and producing department of Socony Mobil Oil Company Inc. Mr. Jones replaced Roland W. Garwood who is being transferred to Mobil Oil de Venezuela.

HARRISON F. MURRAY has been appointed to the newly created position of chief staff geologist, Lion Oil Company division of Monsanto Chemical Company. He will be located in Houston. He was senior geologist in Denver.

WILLIAM A. FRASER, manager of the materials department of the Venezuelan Atlantic Refining Co. has retired after 41 years. He joined Atlantic in 1919 as a civil engineer and since that time has held various positions in the firm's crude oil production department including that of resident engineer in Cuba and in Haiti.

H. F. NABORS, Oklahoma City, has been promoted to the newly created position of manager of production in Continental Oil Company's foreign department. He was formerly general manager of Continental's central region. He will make his new headquarters in New York City.

H. F. Nabors

G. S. Dunham

CLARK S. TEITSWORTH will retire on May 17 as a director and senior vice president of Socony Mobil Oil Company, Inc., after 34 years' service. **GEORGE S. DUNHAM** will assume responsibilities for marine transportation, supply and distribution and purchasing departments. Mr. Dunham is also a member of the Socony Mobil board of directors. **FRANK S. COOPER, Jr.** will assume Mr. Dunham's responsibility as executive vice president—Far East, of Mobil International Oil Co.

Mr. Teitsworth joined a Socony Mobil affiliate in Los Angeles in 1926. He was elected to the Socony Mobil board of directors in 1947 and became vice president in charge of supply and distribution in 1953.

Mr. Dunham has ben a director of Socony Mobil since 1953 and an executive vice president of Mobil International since 1959. He joined an affiliate of Socony Mobil in Augusta, Kan., in 1925 and became manager of the refinery engineering division in 1936. He was named to head the company's manufacturing operations in the United States in 1949.

Mr. Cooper joined Socony Mobil in 1945 and became vice president of Mobil Overseas Oil Co., predecessor to Mobil International in 1956 and executive vice president of Mobil International in 1959.

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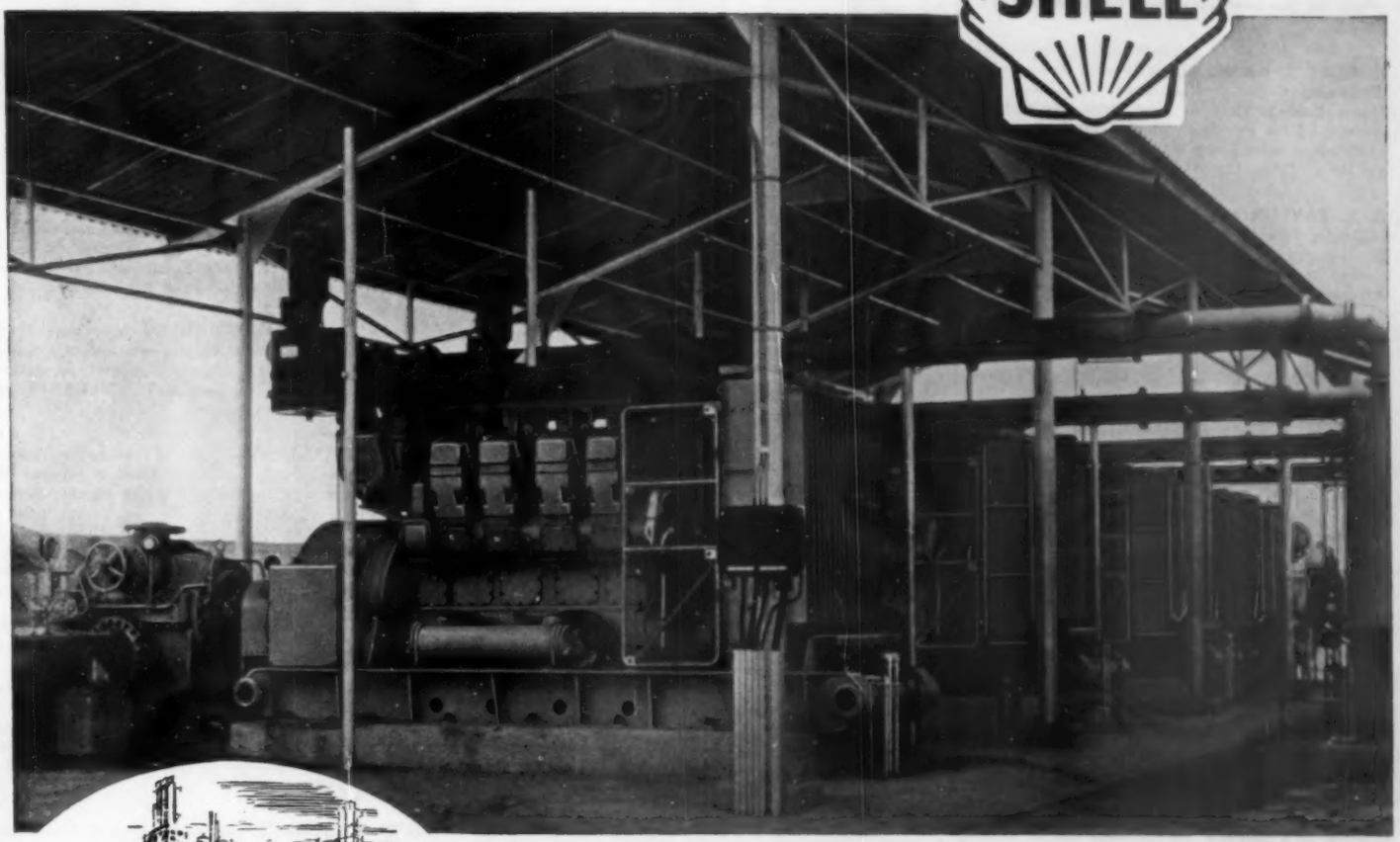

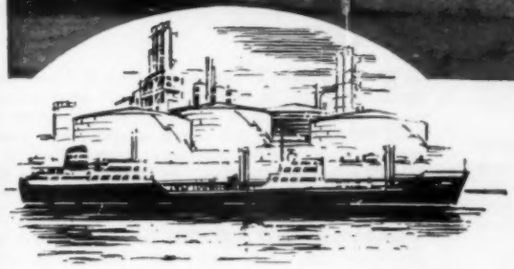

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W. L. HUNTER, special sales representative in Oklahoma City for Hughes Tool Co. retired March 31 after 31 years with Hughes and 47 in the industry. He was named special sales representative by Hughes in 1958 when he reached retirement age but elected to remain active with the company.

J. A. SKIPTON and **W. C. BALLIN** have been appointed to the staff of the vice president of administrative services of the Ohio Oil Co. Mr. Skipton has been named assistant to the vice president and Mr. Ballin has been named public affairs coordinator. Both men formerly were members of the company's public relations division.

CARSTENS SLACK has been made manager of Philips Petroleum Company's Washington office, replacing the late E. D. McElvain. He formerly was manager of the company's public relations division where he has been succeeded by **JAMES FITCHETTE.**

ROBERT T. KRAFT, formerly with Tennessee Gas Transmission Co in Oklahoma City, has joined Union Carbide Corp at New York. He will be a member of the petroleum division of the purchasing department specializing in procurement of natural gas for all Union Carbide divisions.

R. L. TAYLOR has been elected vice president of Magnolia Pipe Line Company and **E. J. WACKER, Jr.** was made a director. **L. E. FRENSLEY** was elected treasurer and **JAMES R. BALL,** assistant secretary.

KENNETH R. JOYNT of Houston has been elected a director, a vice-president and manager of producing of Mobil Oil Co. of Canada Ltd., Calgary. He has been operations superintendent for the Houston exploration and producing division of Mobil Oil. Mr. Joynt joined the former Magnolia Petroleum Co. in 1946. He headed Magnolia's South Texas exploration and producing program until the merger into Mobil Oil.

B. A. VALLERGA has been named director of products engineering for Golden Bear Oil Co., Los Angeles. He will supervise engineering and promotional activities relating to the applications of its petroleum products in the areas of soil conservation and highway construction. He has been managing engineer of the Asphalt Institute in California.

G. GORDON BIGGAR has been named vice president in charge of public relations for Shell Oil Co. to succeed H. L. Curtis, who retired March 31. Mr. Curtis has been vice president since 1955.

Mr. Biggar, who has been manager of the public relations department since 1952, began his oil industry carreer in 1926 as a service station attendant with the New England Oil Refining Co. in Boston. He joined Shell in 1929. He has been in public relations since 1941.

G. G. Biggar

J. W. Meehan

J. W. MEEHAN, formerly president, The Derby Refining Co., Wichita, division of Colorado Gas and Oil Co. has been named president of The Vickers Refining Co., a newly created, separate division of The Vickers Petroleum Co., Inc. He also was elected a director and vice president of the parent company.

A. R. REHRIG has been promoted to manager, market development, in the sales and development division of its international department of Phillips Petroleum Co. at New York. He has been technical assistant to the manager of manufacturing in Phillips refining department.

CHARLES E. PAULES, who was primarily responsible for the design and construction of 35 oil refineries around the world, representing a two-billion-dollar investment, has retired as a vice president of Esso Research and Engineering Co.

During the almost 41 years that Mr. Paules was associated with the company's engineering work, that activity has grown 20 times its original size. When he joined firm's general engineering department in 1919, there were 40 men in the group. The present engineering strength of the company is about 800 persons.

DR. ADALBERT FARKAS has been named assistant director of research at Houdry Process Corp. He previously headed the organic research section used in production of polyurethane foams.

B. FRANK HARRISON has been appointed vice president in charge of finance for Stekoll Petroleum Corp. He comes from Corpus Christi, where he helped establish the Santa Rosa Gas Co. and the Wiltex Corp. Previously he had been controller of La Gloria Oil and Gas Co.

E. F. WENTWORTH, Jr. and **F. M. PYZEL** have been appointed vice presidents of Foster Wheeler Corp. Mr. Wentworth, who joined the firm in 1941, has been General Attorney since 1950. Mr. Pyzel joined Foster Wheeler in 1944 as director of process development in the firm's engineering department. In 1959 he was made director of Foster Wheeler's process development department.

TOM LINDHOLM has joined Photogravity Co. Inc., Houston, as executive vice president. He formerly worked for The California Company in charge of the gravity and magnetics Dept.

CHARLES E. STRANGER has been named director of personnel for the Independent Exploration Co., Houston. Before joining Independent Exploration Company he was with the Houston Natural Gas Corp. as a training assistant.

R. VANCE NUGENT has been appointed purchasing agent for the recently enlarged Magnolia Pipe Line Co. with headquarters in Dallas. He was formerly purchasing agent for the central pipe lines division at Wichita, Kan.

FRANCIS C. SAVAGE has been named manager of Mobil International's distribution planning department. He was assistant manager of Mobil International's manufacturing department. Mr. Savage joined the company in 1934 as a tester in Beaumont, Texas. In 1946 he was transferred to New York as coordinator, lube oils and in 1955 became manager of the operations division.

RALPH A. LARSEN has been appointed chief design engineer of Stone & Webster Engineering Corp. He succeeds Charles D. Lilburn who has been named design consultant.

ROBERT K. BROOKE has been named assistant to the president of the Independent Refiners Association of America. He will be a permanent full-time employee of the association at Washington. He has been with Asiatic Petroleum Corp. for 20 years, initially in New York and since 1948 in Washington, D. C.

JACK ARNOLD, Jr., has been named marketing coordinator of the Enjay Company, Inc.'s butyl division. He has been manager of the Boston office.

ERIC G. LINDROTH has been elected senior vice president for finance of Esso Export Corp. **GLENN W. POORMAN** was named senior vice president for supply, and **GEORGE D. COMNAS,** sales.

Mr. Lindroth joined Jersey Standard in 1932 and transferred to Creole Petroleum Corp. in 1944 as assistant treasurer. He joined Esso Export Corp. in 1948 and was elected a vice president in 1954.

Mr. Poorman joined Jersey in Louisiana in 1932 and in 1944 moved to New York as assistant to the general manager, supply and transportation. Since January 1959, he has been a director, vice president and member of the executive committee of Esso export.

Mr. Comnas joined Humble Oil & Refining Co. (Texas) in 1936 and transferred to Creole in 1940. He came to Jersey's foreign marketing department in 1945 and joined Esso Export in 1949.

DR. R. W. BRAUCHLI, Oklahoma City, has been made vice president of exploration and production for Anderson-Prichard Oil Corp. following a consolidation of its production and exploration activities into a single department.

Dr. Brauchli was appointed vice president of the exploration department in 1947.

DONALD D. DAVIDSON has been elected a vice president of the Golden Bear Oil Co. responsible for manufacturing operations. Mr. Davidson joined Golden Bear in 1952 as chief engineer and has most recently served as manager of manufacturing.

D. D. Davidson

W. D. Hamm

W. DOW HAMM has been elected a vice president and general manager of crude oil production of The Atlantic Refining Co. He succeeds **LAURENCE A. SUNKEL,** who will devote his attention to special crude oil production activities, pending his retirement early next year. Mr. Sunkle will continue as a director and a vice president of Atlantic.

WILLIAM G. COPELAND has been elected vice president in charge of the domestic refining department of Texaco Inc. Formerly general manager of the department, he succeeds **FREDERIC H. HOLMES,** who has retired.

HENRY FLYNN, manager of Texaco's refinery at Port Arthur, Texas, has been named to succeed Mr. Copeland as general manger of the refining department.

Mr. Copeland joined Texaco in 1927. He was named general superintendent of the Port Arthur works in 1954, and was promoted to operations manager in New York in 1956 and general manager in 1957.

Mr. Holmes began his service with Texaco in the Caribbean in 1927, was elected vice president in charge of the research and technical department in 1954, and head of the domestic refining department in 1959.

Mr. Flynn joined Texaco in 1927 and was appointed superintendent of manufacturing at Port Arthur in 1953, general superintendent in 1956, and works manager in 1958.

E. D. BROCKETT and **I. G. DAVIS** have been elected directors of Warren Petroleum International Corp. Mr. Brockett is executive vice president of Gulf Oil Corp. and Mr. Davis is senior vice president of Gulf. Warren Petroleum International is a subsidiary company of Gulf Oil Corp engaged in the international marketing of LPG.

WILLIAM H. THORBECKE has been named assistant manager of the petroleum chemicals division of Mobil International Oil Co. He was formerly manager of the international division and managing director of the overseas subsidiary of Continental Carbon Company, New York. Prior to this, he was engaged for a number of years in petroleum chemical market development activities in Europe and Japan.

ALBERT BENJAMIN has been named Director of Public Relations for Texaco Inc. He has been manager of the department's Latin American Division at Caracas. He will succeed **THOMAS D. DURRANCE,** who has been appointed manager of public relations for Texaco's affiliate, Arabian American Oil Co.

W. S. FRISBIE has been transferred to a newly-opened regional office at 1203 Gulf States Building, Dallas, for Falcon Seaboard Drilling Co. He will continue to serve as a special representative. Mr. Frisbie began his career in the industry with Frick-Reid Supply in 1936. He joined Falcon Seaboard in 1958.

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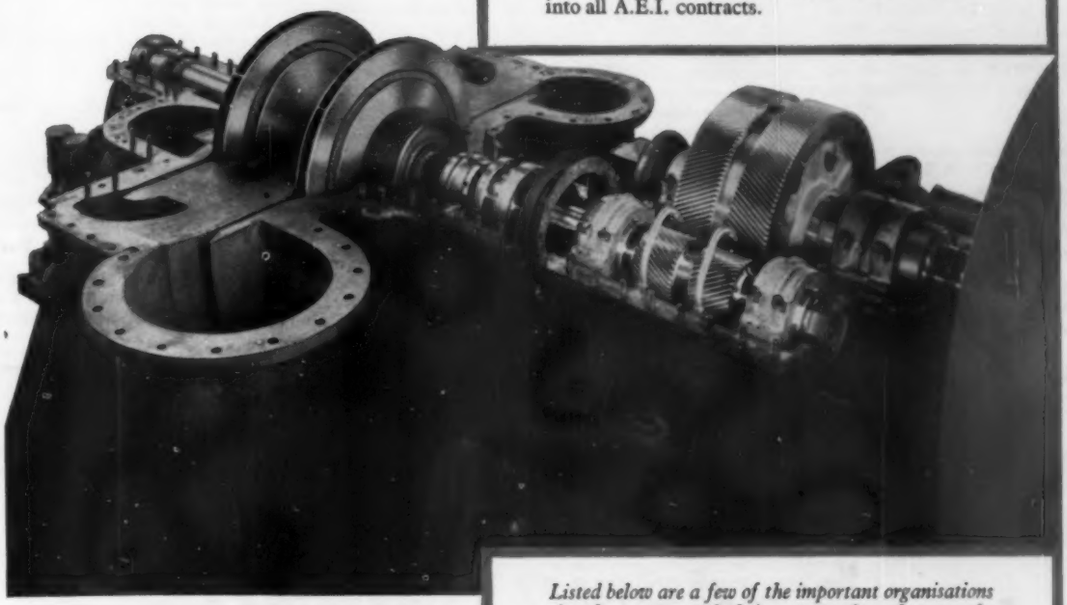

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GEORGE L. MATEER has been elected president and general manager of Cities Service Refining Corp. succeeding Louis D. Mann, who is retiring. Mr. Mateer has served as vice president, director and assistant general manager of the refining company since 1955. He has been with Cities Service in various refining and manufacturing activities since 1943, prior to which he was with Standard Oil Co. (N.J.).

Mr. Mann, a veteran oil industry official, is retiring after more than 43 years service with the Cities Service organization. He joined Cities Service in 1917 and became general manager of the Cities Service Lake Charles refinery in 1946, and was elected president of Cities Service Refining Corp. in 1951.

JOHN T. OXLEY, formerly president of Texas Natural Gasoline, has been named executive vice president of Union Texas Natural Gas Corp., following a merger of Texas Natural and Union Oil and Gas. **FRANK B. MARKLE, WAYNE V. JONES, DANIEL B. LOVEJOY** and **R. C. FREDERICK** were elected senior vice presidents.

The remaining officers and their titles are: **MAXWELL L. EUWER,** vice president, producing operations; **HAROLD G. TEVERBAUGH,** vice president, plant operations; **ELLIOTT H. POWERS,** vice president, exploration; **O. M. BAILEY,** vice president, marketing; **CLAUDE C. HARRIS, Jr.,** vice president and controller; **W. P. WYRICK,** vice president; **DONALD K. HAWES,** secretary and treasurer; **RUSSELL A. PETERSON,** assistant secretary and assistant treasurer; **L. A. STUEWER,** assistant secretary and assistant treasurer; **MRS. STACEY PHILP,** assistant secretary.

ROBERT L. GRAY, transportation manager, river operations department of Ashland Oil & Refining Co., Inc., was elected chairman of The American Waterways Operators, Inc., at its annual meeting Feb. 23 in Washington, D. C. He succeeds David A. Wright, president of National Marine Service, Inc., New York.

T. A. ALDRIDGE, vice president-marketing for the American Oil Co. has been named director of marketing development for Societe Civile Amoco in Paris, France, effective April 1. He will assist in the worldwide development of markets for crude oil and petroleum products.

G. L. Mateer

A. M. Vazquez

Reverse Circulation Rig

Strato Drill, Inc. has been formed in Houston to manufacture a new rig which takes a continuous core from grass roots to the full depth of the hole using reverse circulation in conjunction with a core bit and a dual drill pipe string which is rotated by a power swivel. Cores 2 in. in diameter and 6 in. long are circulated to the surfaces through the core tube and onto the shale shaker where they are retrieved and placed in trays.

Homer Henderson, who developed the method and equipment, is chief engineer. He has had over 27 years' experience in the oil industry, primarily in research and development, and included more than 20 years with McCollum Exploration Co.

Drill Stem Jar

Southwest Research Institute has developed a hydraulic percussion jar for Bowen Itco Inc. to be used in loosening stuck drill stems. The jar is inserted in the drill collar string directly above the bit. It may be brought into service by pumping a plug down from the surface creating a continuous upward jarring effect when the plug lands on its seat.

Cameron In Bolivia

Cameron Iron Works, Inc. has increased sales representation in South America with the appointment of Alberto M. Vazquez as agent for the sale of Cameron Products. His company is Equipo Petrolero, Ltd., Casilla 11359, La Paz, Bolivia.

Refineries for Bavaria

Transalpin, Bavaria's State-sponsored pipeline study group, has announced Esso and Shell may build Bavaria's first two refineries; and they may also participate in one of the proposed pipelines from the Mediterranean. Other companies, including British Petroleum, are also said to be interested.

Iran Fixes Closing Dates

National Iranian Oil Co. has announced May 15 as date for closing of "open" areas of Iran on which no oil agreements have been made. Until such time as they may again be declared open, parts of Districts 1, 3, 4, 8, 14, and 18 will be declared "closed."

Oil In Philippines

"Positive indications" of presence of oil in northwestern Leyte in the Philippines have been reported by White Eagle Overseas Oil. Indications specified are many oil and gas seeps and tar and solid bitumen deposits in the area, site of the company's present exploitation activities.

Cambodia Is Surveyed

Soviet Chinese are making geological surveys in Cambodia, and the Cambodian government is negotiating for the purchase of drilling equipment and technicians from communist countries.

Thailand Survey

Upon receipt of an exploration permit, Shell International Petroleum will begin a preliminary survey of the Korat plateau in northeastern Thailand.

Did you know that:

The Province of Alberta, over the past nine years, has had an average gas reserve growth of 2.9 Trillion cubic feet per year from 346 to 469 wildcats per year for a discovery rate of 6 billion to 7 billion cubic feet per wildcat drilled.

PROVINCE OF ALBERTA

DEPARTMENT OF MINES AND MINERALS

H. H. Somerville, Deputy Minister

Hon. Ernest C. Manning, Minister

Mohammed ibn Rajih Mohammed, leading engine room operator, checks gauges on one of the two Ruston gas turbines at Nariya pump station which is on the pipeline system that transports oil from Aramco installations to the Tapline terminal at Sidon, Lebanon. Many Ruston gas turbines are now operating on Aramco's pipelines in Saudi Arabia.

Mohammed and his Ruston turbines

To Nariya came two Ruston gas turbines . . . and Mohammed ibn Rajih Mohammed found himself in control of industrial power in its most advanced form. But Mohammed, who is now leading engine room operator at the Arabian American Oil Company's Nariya pump station in Saudi Arabia, soon recognised the simplicity of operating a Ruston gas turbine . . . that's just one of many features of these turbines which have made them so popular with oilmen from the Middle East to the Americas.

RUSTON GAS TURBINES UP TO 1260 B.H.P. at 80° F. ambient temperature

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Representatives for Petroleum Industries in the U.S.A.; Beckley, Haltom & Hickman, The Americas Bldg., Rockefeller Center, 1270—6th Ave., New York 20, N.Y.C.

Cornelius Verlome Visits USA

Cornelius Verlome, owner of the Verlome United Shipyards, Rotterdam, was a recent visitor to New York. Mr. Verlome opened a small shop for diesel engine overhauling in 1946. Since that time his operations have expanded through the building of three shipyards, engine and electrical factories in Holland and yards in Norway and Ireland. A new yard is being built in Brazil. Verlome enterprises now employ more than 5,000 persons.

UOP Buys Trubek Laboratories

Universal Oil Products Co. acquired controlling interest in The Trubek Laboratories, East Rutherford, N. J., manufacturers of specialty chemicals. The agreement provides for 100% ownership of the Trubek stock within two years. The total payment by Universal is expected to be approximately $6 million. Acquisition is being accomplished entirely through the use of cash generated by UOP operations, requiring no new equity or other capital financing.

SSC Sales Higher

An all time high in contract sales and services was enjoyed by Seismograph Service Corp. in 1959. Total sales of $17,620,522 increased $1,342,841 over 1958.

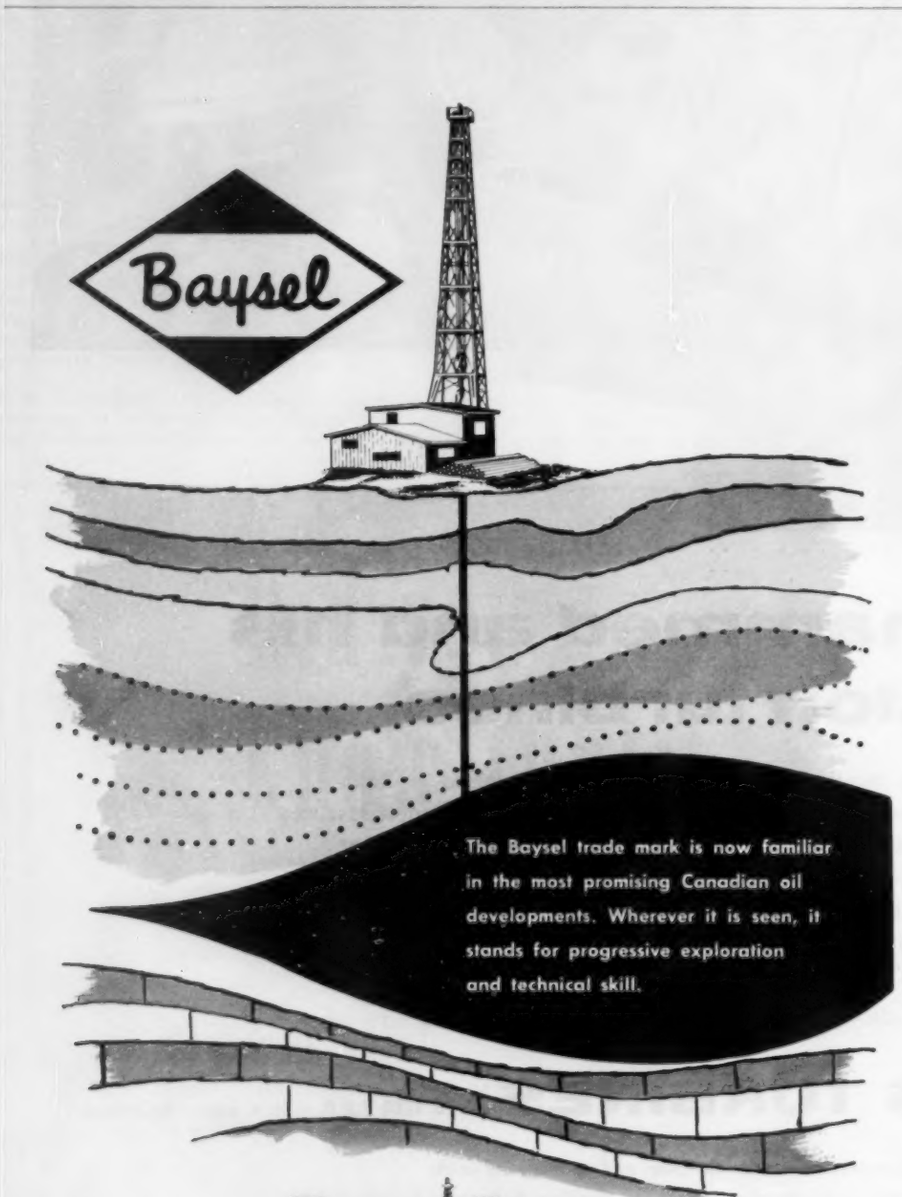
Opens New Branches

Canada's first independent perforating company, GO Canadian Perforators, Ltd., has added two new service branches. The firm now has service offices at Edmonton, Red Deer, and Alberta.

Ballast Tray Bulletin

Fritz W. Glitsch & Sons, Inc., Dallas, has published a new technical bulletin entitled "Glitsch V-1 Ballast Tray" giving performance curves and detailed operating data on the fractionating device, based on extensive laboratory tests conducted by Fractionation Research, Inc.

Write for bulletin No. 120 to Glitsch sales office, 4900 Singleton Blvd., P. O. Box 6227, Dallas.


Baysel
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French Pipeliners In Tulsa

Representatives from the two largest pipeline construction organizations in France recently visited Crose-Perrault Equipment Corp. at Tulsa. The French firms are laying several hundred miles of pipeline in the Sahara Desert. In photo (left to right), Paul Simeon, managing director of pipeline construction for Societe Parisienne pour l'Industrie Electrique; Paul Evans, Crose-Perrault sales engineer; J. L. Guyot, director general of Societe Entrepose, and John Manley, the Tulsa firm's export sales manager.

Grove Appoints N. Y. Manager

Grove Valve and Regulator Co., Oakland, Calif., has appointed Charles Carter district manager in the New York region. He will direct sales in the Middle Atlantic and New England states.

Stone & Webster Appointments

Raymond C. Foster and Robert H. Willis have been elected as vice presidents of Stone & Webster, Inc. Both had been assistant vice presidents since May 1959.

Builds Largest Pumper

The world's largest oilfield pumping truck for fracturing has been completed by Stewart & Stevenson Services, Inc. and put into operation in West Texas by The Western Co. Two pumps on the truck are equipped with 5-inch plungers, will deliver 1120 hydraulic horsepower equivalent to 22.8 bbl/min at 2000 psi; 11.4 bbl/min at 4000 psi, and 5.7 bbl/min at 8000 psi.

McKee Expansion

Arthur G. McKee & Co. has formed a new operating subsidiary in Mexico and is forming a similar firm in Brazil. The Mexican subsidiary, A. G. McKee de Mexico, S.A., will be headquartered in Mexico City. Last August a British company, McKee Head Wrightson Limited, was formed by McKee and Head, Wrightson & Co. Ltd., of Thornaby-on-Tees, England.

Fire Hose

"Properties of Industrial Fire Hose Jacketed 100% with Dacron" is the title of du Pont Bulletin d-115. Write Technical Service Section, Textile Fibers Dept., du Pont Co., Wilmington 98, Del.

Friction Reducers

Dowell division of Dow Chemical Co. has published a technical report on properties of friction reducing agents for fracturing. Write Dowell at Tulsa or nearest office for report on j98, 99 and 100. Another new technical report covers a new sand control tool "Sandban screen."

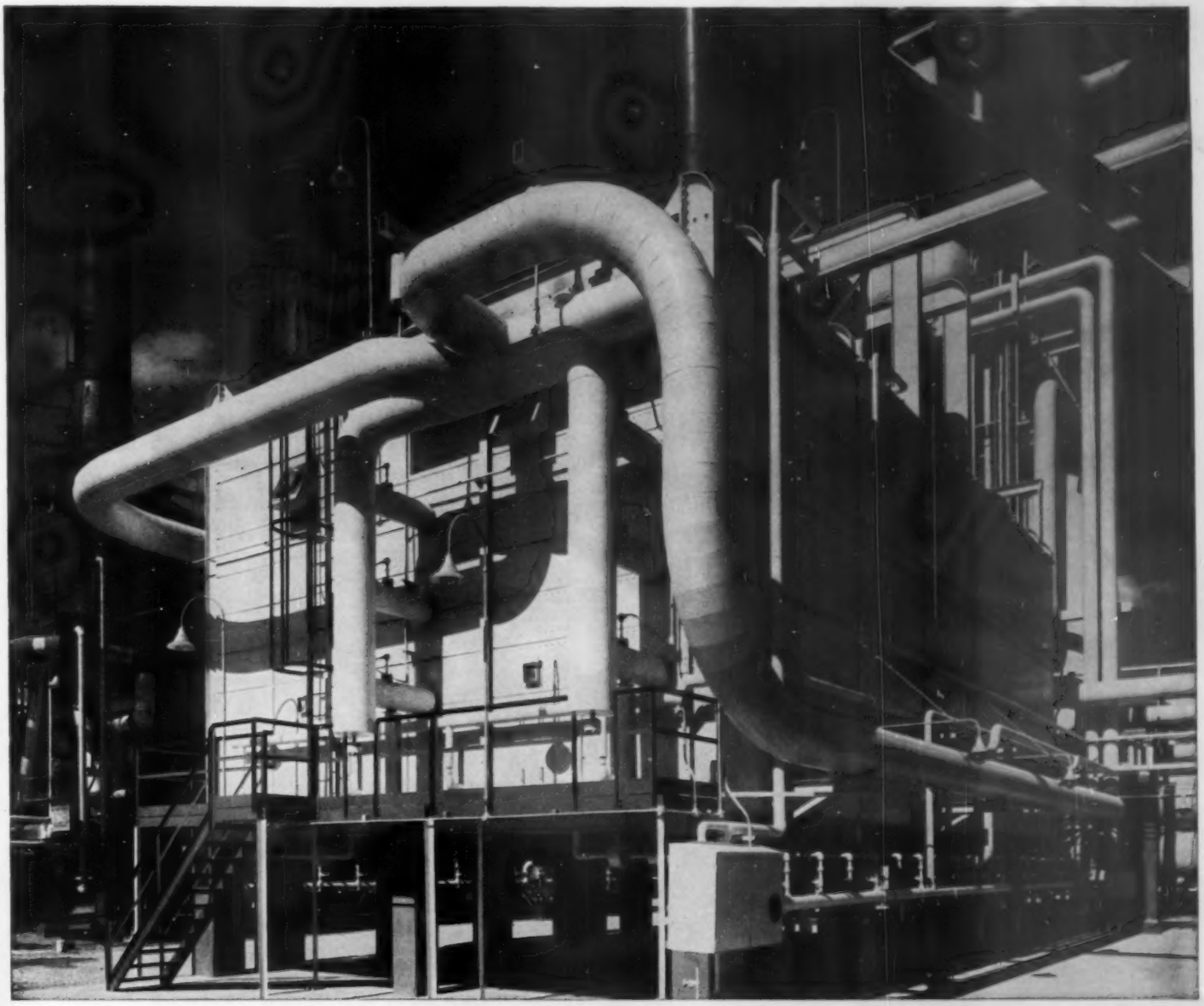
Manager Jet Process

V. C. Horner, vice president of Byron Jackson division of Borg-Warner Corp. has been named operations manager of the jet process section. Formerly sales manager of Byron Jackson Tools, Inc. he most recently served as general manager of BJ Electronics, Santa Ana, Calif.

USA Explorers In Australia

An Australian subsidiary of Texas-American Oil of Midland, Texas, plans a geological survey of its 3.2 million-acre concession in New South Wales at the southern tip of the Great Artesian basin. Hackathorn Oils, a Denver, Colo., independent, expects to start drilling this summer on its 23 million acres in the Murray River basin of South Australia.

Lower Costs + Higher Efficiencies



that's what makes **BORN** *heaters*

BORN Heaters mean lower construction, operating and maintenance costs with higher efficiencies and greater safety. Developing over 85% heating efficiency, without costly blowers, fans and other mechanical equipment, these heaters range from 500,000 to more than 200,000,000 BTU per hour absorption duty. Special Born features include the airtight plenum chamber, safeguarding against external explosions, suspended tube arrangement, even heat distribution, removeable wall panels, etc. Find out all about Born Heaters and how they can work more efficiently for you. Your enquiry to the address below will bring full details and technical data.

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Overload Protection

A new kind of overload protection for oil well pumping motors has been announced by General Electric. The protection is provided by two or more miniature heat-sensing switches buried in the stator windings. The switches, connected in series with conventional motor control, shut the motor off whenever internal winding temperature exceeds a predetermined amount regardless of rate of temperature rise.

Customers' Building

Avondale Marine Ways, Inc. has built a porcelain enamel building with 8400 square feet of floor area to provide office space for resident customers and inspectors. Located adjacent to the engineering & research building and Avondale's main administration building, the customers' quarters are convenient to the company's activities; but, since they are a separate facility, assure privacy to customer.

Reed Bit Sales Higher

Sales of Reed Roller Bit Co. for 1959 were $28,171,348, compared with $25,340,314 for the year before. Reed added 50 new types and sizes to its line of drilling bits in 1959, bringing the total to about 250 and increasing to 85% the company's coverage of the rock bit market. In 1960, 75 additional types and sizes are scheduled to be added. Continuing its expansion program in 1960, capital expenditures will amount to approximately $3,500,000, compared with $1,500,000 in 1959, and less than $500,000 in 1958.

Compact Tractor

A tractor with V-8 engine and bumper-to-back-of-cab dimension of only 90 inches is the White Truck Division's newest addition to its heavy-duty tractor line. The new tractor is for transport jobs in the 65,000 to 80,000 pounds GCW range.

Venezuela Distributor

Oil Field Sales and Service, S.A. in Maracaibo, has been appointed a distributor for Gardner-Denver oilfield equipment in Venezuela. Main offices and warehouse facilities are in Maracaibo, service and repair shops and warehouse facilities in Tia Juana and Anaco.

HOMCO Promotions

Houston Oil Field Material Co., Inc. (HOMCO) has transferred George Rush from foreign sales and service representative to export sales at Houston.

USA Reserves Increase

Proved known reserves of crude oil and natural gas liquids rose 501 million barrels in 1959 to 38,241 million according to estimates of the American Petroleum Institute. Natural gas reserves increased 8,455,000 billion cu ft to 262,597 billion.

New crude reserves discovered in 1959 totaled 369 million barrels, extensions of old pools added 1,779 million barrels while previous estimates were revised upwards by 1,519 million.

Reserves of liquid hydrocarbons represented 11.1 years' supply at the 1959 rate of consumption, unchanged from the previous year. Additions to reserves kept pace with consumption for the first time in a number of years.

Additions to crude reserves were concentrated in three states. Louisiana added 616 million barrels, Texas 537 million and New Mexico 132 million. Thirteen states show lower reserves.

USA PROVED RESERVES OF PETROLEUM
(Millions of Barrels)

	12/31/58	12/31/59	Incr.
Crude oil	30,536	31,719	1,183
Nat. Gas Liquids	6,204	6,522	318
Total Liquids	36,740	38,241	1,501
	Millions of Cubic Feet		
Nat. Gas	254,142	262,597	8,455

PRODUCTION
(Millions of Barrels)

Crude oil	2,373	2,483	110
Nat. Gas Liquids	342	385	44
Total	2,714	2,868	154
	Millions of Cubic Feet		
Nat. Gas	11,485	12,441	956

Analysis of Reserve Changes
(Millions of Barrels)

Crude oil		
Reserves Dec. 31, 1958		30,536
Revisions	+ 1,519	
Extensions	1,779	
New Discoveries	369	
Total Additions		3,667
1959 Production		2,483
Reserves Dec. 31, 1959		31,719
1959 Increase		1,183
Natural Gas Liquids		6,204
Revisions and Extensions	+ 594	
New Discoveries	110	
Total Additions		703
1959 Production		385
Reserves Dec. 31, 1959		6,522
1959 Increase		318
Total Liquid Hydrocarbons		
Reserves Dec. 31, 1958		36,740
Revisions	+ 3,891	
Extensions	479	
New Discoveries	4,370	
Total Additions		4,370
1959 Production		2,868
Reserves Dec. 31, 1959		38,242
1959 Increase		1,502
Natural Gas (Millions of Cubic Feet)		
Reserves Dec. 31, 1958		254,142,037
Extensions and Revisions	+ 14,933,109	
New Discoveries	5,801,749	
Storage Increase	161,326	
Total Additions		20,895,184
1959 Production		12,440,628
Reserves Dec. 31, 1959		262,596,593

Mere drops in the ocean
Brunei Shell Petroleum's 'Orient Explorer' for the South China Sea. 2,500 h.p.
Abu Dhabi Marine Areas Ltd's 'Adma Enterprise' operating in the Persian Gulf. 3,500 h.p.
The Compania Shell de Venezuela's "GP6". 3,000 h.p. Four of this type and two larger 4,800 h.p. barges are in operation on Lake Maracaibo. Shell Nigeria also operate two of the 3,000 h.p. barges.
Specks on the horizon, small in comparison to the oceans surrounding them but powerful self-contained working units, these drilling platforms and barges are employed in round-the-clock exploration drilling from the Persian Gulf to the South China Sea . . . just a few of many offshore structures powered by dependable Paxman diesels.
Trinidad Northern Areas Ltd's 2,000 h.p. drilling platform operating in the Gulf of Paria.
Over 700 oilfield engines are in world-wide operation with 16,000,000 hours of accumulated service.

Paxman diesels, for rig drive and auxiliary duty assure you of dependable service and maximum output at lowest cost. Check these facts for your next offshore installation:

- ★ Liquid-cooled engines 100—2,400 h.p.
- ★ Air-cooled engines up to 486 h.p.
- ★ Compact and lightweight.
- ★ Maximum interchangeability of engines and components for all services.
- ★ Mechanical or electric transmission for rig engines.
- ★ The only British field-proven quantity-built oilfield engines ashore or afloat.

PAXMAN diesels FOR ALL OILFIELD DUTIES AFLOAT AND ASHORE

6", 7" and 9¾" bore ranging from 90 to 2,400 h.p.

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Obviously, there is no single operator which is "best" for every application in the petroleum business. That's why General Controls offers all three: powerful electro-hydraulic valves for well-site applications, electric direct-drive valves for transmission lines, air-actuated proportioning valves for in-plant applications.

Take the famous General Controls HYDRAMOTOR, for example. You'll find this powerful electro-hydraulic operator ideal for line sizes up to 8" for high-pressure, high-flow applications. Two-wire, slow-opening, fail-safe.

For the really big jobs, line sizes up to 60", it's the General Controls TORK-MASTER. This gear-driven electric operator can be adapted to new or old systems—*and with a minimum of costly down-time during the changeover.*

For heavy duty proportioning applications, you'll find the HARRISON-DAHL air-operated diaphragm valve worth looking into. *And no electrical control or power circuits are required in proportioning operations.*

No matter which you select for your particular job, the important thing to remember is: *General Controls is a single source for all three types . . . and in all standard sizes.* For full information, expert field help, write today to

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Buys Interest In France

A substantial interest in Luceat, S.A. of Sens, France, has been acquired by the Oil Center Tool Co. of Houston, Texas, according to W. A. Wolff, O-C-T president. Luceat, S.A., founded in 1921, is a manufacturer of components for the petroleum and other industries. A wide range of O-C-T wellhead equipment will be manufactured by the French concern. H. O. Quebe, O-C-T's assistant chief engineer, is currently stationed in Sens and will remain there to assist Luceat in the initial production.

Buys Internuclear

Petrolite Corp. has acquired all the assets of the Internuclear Co. of Clayton, Mo., which provides engineering and consultation services to nuclear organizations all over the world.

Schlumberger Appointment

F. L. Bryan has been promoted to director of personnel relations for Schlumberger Well Surveying Corp. He succeeds Gordon W. Watson who has been transferred to Schlumberger Limited.

Heads Cooper-Bessemer of Canada

Harold C. Johnson has been named a vice president of Cooper-Bessemer of Canada, Ltd., in charge of manufacturing operations. C. W. Gilchrist was appointed plant manager of the new plant at Stratford, Ontario.

Neely Joins Avondale

Avondale Marine Ways, Inc. has appointed Ed Neely as sales engineer for the oil tools department. Formerly he was with the Hydril Co.

Rollo Overseas Expansion

The Rolo Manufacturing Co., Houston, is considering expansion overseas through the formation of European subsidiaries and the construction of one or more European manufacturing facilities. President Robert K. Franklin is presently in Europe for an on-the-spot appraisal of the foreign market for the Houston firm's oil metering equipment. The equipment is currently in use in 30 different countries.

R. K. Franklin

S. L. Stentz

Sargent Engineering Appointment

Sturgis L. Stentz has been made manager of the systems division of Sargent Engineering Corp., Huntington Park, Calif. This division will be concerned with the design and installation of Sargent's closed system concept, which involves equipment buildup through any stage of a process for complete automation.

Austrian Rigs for Argentina

The Austrian firm of Schoeller-Bleckmann has been delivering to YPF (the Argentina State company) an undisclosed number of drilling rigs valued at $2.8 million. Further deliveries valued at $2 million are being negotiated.

Bottomley Heads Treco

Harold Bottomley has been named regional manager of Vitro Engineering Co. in charge of the Treco Division. He will have full responsibility for operations of the Tulsa office, which include engineering, construction and sales. Vitro dissolved the presidency of Treco, an office which had been held by Woodman Perine, who continues as vice president of Vitro in charge of technical services and products group.

Halliburton Appointments

Four changes in Halliburton Oil Well Cementing Co.'s domestic field organization are being announced by Harry P. Conroy, vice president in charge of field operations.

D. J. Sargent has been named assistant division manager for the New Orleans division; R. W. Graham is the new division engineer for the Denver division. John Banister, who has been division engineer at Denver, has been promoted to assistant division manager at Lubbock, and Leroy Muse has been named testing and tools superintendent for Halliburton's Oklahoma City division.

Tennessee Overseas Organized

Tennessee Gas Transmission Co. has organized Tennessee Overseas Co. as an operating division for its growing foreign operations. R. C. Graham is president and S. C. Oliphant is executive officer.

NEW PUBLICATIONS

Proceedings of the Institute on Private Investments Abroad by Southwestern Legal Foundation, Dallas, Texas. A collection of papers on the problems of United States investors in various countries, including foreign and domestic taxation, antitrust, patents, and trademarks and expropriation problems, presented at the five-day Institute meeting held June 22-26, 1959. Several papers are of particular importance for oil, including a review by Lionel V. Charlesworth, International Petroleum Co., Ltd. entitled "Problems Relating to Petroleum Operations in Latin America" and another entitled "Middle East Oil Operations" by Elston R. Law, Gulf Oil Corp. Available from Matthew Bender & Co., Inc., 255 Orange St., Albany, New York.

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American specifications . . .

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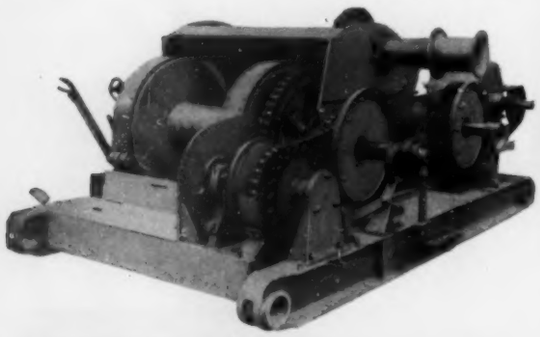
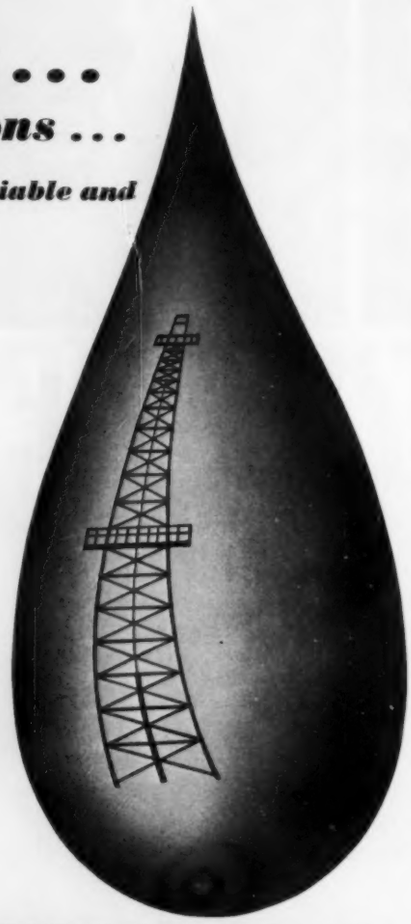
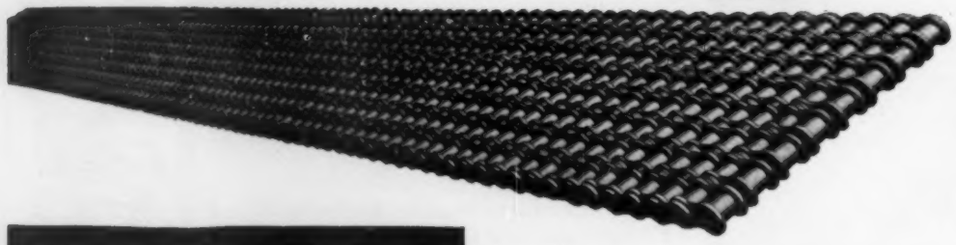
Renold ASA series chains are available throughout the world from ·625″ to 2·5″ pitch in single and multiple strand widths and are backed by the production resources and know-how of the world's largest manufacturers of precision roller chain.
They are fitted as original equipment by Ideco-Woodfield, Armstrong Whitworth, and on National Supply draw-works manufactured in Great Britain by The Oil Well Engineering Co. Ltd.







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you will find ample evidence of the part played by the Thornycroft Organisation in serving the Oil Industry. Our heavy duty trucks, especially designed and built to individual requirements, are used in all spheres of oil production and distribution from the first surveys to the delivery of the end products.

We illustrate above the first specially built British vehicle commissioned by Halliburton Ltd.: it is a Thornycroft "Trusty" Tractor with Dyson semi-trailer. The Tractor is fitted with a winch and A frame for hoisting acid containers and the self-loading oilfield type of semi-trailer can be used for a variety of purposes.

Vehicles of this type have been ordered for Halliburton operations in Turkey, Yugoslavia and Libya.

Thornycroft boats and marine engines give similar service afloat and our range of industrial units provide power for plant and machinery, and lighting.

Literature on all aspects of our products is available on request.

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BRANCHES AND AGENTS THROUGHOUT THE WORLD

Halliburton Names Supervisor

Harold Grant has been named regional training supervisor for Halliburton Oil Well Cementing Co.'s southern region—its Corpus Christi, Houston, New Orleans and Shreveport divisions. He succeeds D. J. Sargent who is now assistant division manager for the New Orleans division.

B-J Promotion

F. H. Trones has been appointed midwestern regional manager for Byron Jackson Pumps, Inc. at Chicago. He was a design and sales engineer for 16½ years in the company's general offices in Los Angeles.

Buys Interest In Mechans

Union Tank Car Co., Chicago, has purchased a major interest in Mechans Ltd., Glasgow, fabricator of storage tanks, pressure vessels and other equipment. Other owners will be Horseley Bridge and Thomas Piggott Ltd., Tipton, Staffordshire.

Jumbo Tank Car

Cities Service Oil Co. has placed in service a "king sized" railroad tank car with a capacity of 20,256 gallons. The new tank car makes possible a minimum reduction in rail transportation costs of more than 17%.

Mid-Continent Slush Pumps

Mid-Continent Supply Co. has added a complete series of Emsco-built power slush pumps, including seven models ranging in capacity from 125 to 1000 hp. Parts are 100% interchangeable with the Emsco line. Outstanding features include fabriform steel construction welded into a low weight frame; wide-faced, forged-steel, heat-treated herringbone gears, a one-piece steel eccentric hub and large diameter eccentric roller bearings for added compactness; exposed liners enable packing leaks to be spotted immediately and corrected prior to washout damage; and flood lubrication by a positive splash and pump lubrication system.

Vaughan Heads S.I.E. Marketing

Southwestern Industrial Electronics, one of the Dresser Industries, has appointed Robert O. Vaughan as vice president, marketing. He was western regional manager of government operations for Dresser Industries, Inc.

Joins BJ Tools In Middle East

William E. Ridgeway has joined Byron Jackson Tools, Inc., as field representative for the near and middle east areas with headquarters at Beirut, Lebanon. His territory includes Aden, Egypt, Eritrea, Ethiopia, Iraq, Iran, Kuwait, Lebanon, Saudi Arabia, the Sudan region, Syria, Turkey and Yemen.

W. E. Ridgeway

J. Stewart

Heads Mission Sales

The appointment of Jack Stewart as domestic sales manager for the Mission Manufacturing Co. has been announced by T. R. Fullinwider, vice president of domestic sales. Mr. Stewart has been with Mission for 19 years, joining the Engineering Department in 1941. In 1955 he was promoted to assistant domestic sales manager. Mr. Stewart succeeds Mr. Fullinwider who just recently was named vice president.

Rockwell Appointment

Henry D. Rolph, formerly in charge of Yale & Towne's overseas operations has been appointed special assistant to the president of Rockwell Manufacturing Co. He will be responsible for coordinating Rockwell's German operations, with headquarters at Pinneberg near Hamburg.

Named Dowell Executive V. P.

A. C. Polk has been appointed executive vice president and general manager of Dowell Division of The Dow Chemical Co. He has been Dowell vice president and general manager. He succeeds John G. Staudt who becomes president of Dow's Dobeckmun Company Division at Cleveland, O.

A. C. Polk

J. E. Lyons

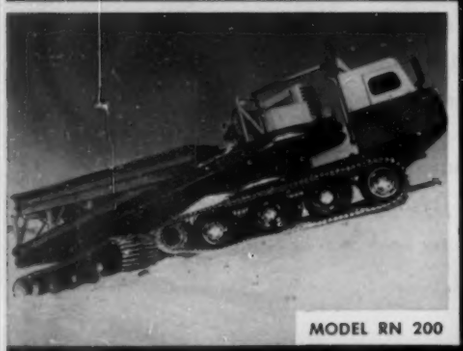
Magcobar Promotions

John E. Lyons, formerly sales manager of the drilling mud department, marketing division, of Magnet Cove Barium Corp. (Magcobar), has been appointed vice president—customer relations. Frank Loe, vice president and assistant manager of the marketing division assumed charge of the drilling mud department.

Gas Engine Bulletin

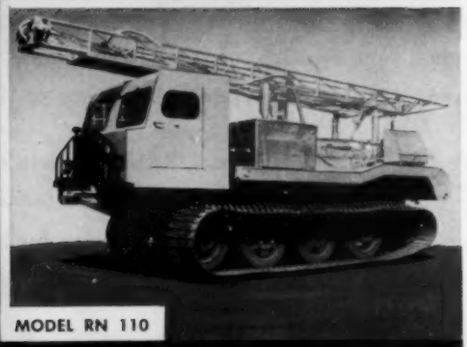
Bulletin 176, issued by Clark Bros. Co., one of the Dresser Industries, introduces the Model TPV, a 2-Cycle, V-Type, Turbocharged gas engine designed as a compact, high horsepower driver for centrifugal pipeline compressors, generators and liquid pumps. Write Clark Brothers Co., Olean, N. Y.

NODWELL TRACKS AROUND THE WORLD



MODEL RN 200

Nodwell's unique, cross-country transporter — power-steered behemoth with 4 tracks, 2 engines. Particularly adaptable to rig moves, it has a rated payload capacity of 20,000 pounds.



MODEL RN 110

Multi-purpose, heavy-duty unit — 11,000 pound payload capacity — clear deck space of 7' by 12' for carrying personnel or freight. Equipped here with 1,000 foot drill — one of this unit's many adaptations.

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Nodwell Tracked Carriers have been tested and job-proven in the field — for the oil industry. A versatile range of models, with carrying capacities from 2,000 to 20,000 pounds, lay their own highways of rubber and steel tracks across quaking muskeg, oozing bog, swamp, and snow. Even when fully loaded, each unit has a ground pressure of 2 p.s.i. or less!

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- Three dimensional running tracks
- Controlled differential final drive
- Powered tracks at all times
- Maximum clear load area
- Engineered for simplicity of maintenance
- Powered and non-powered camp units available

The complete success story of Nodwell Tracked Carriers is told in our new picture brochure. Write and we will be pleased to send a personal copy along with specification sheets:

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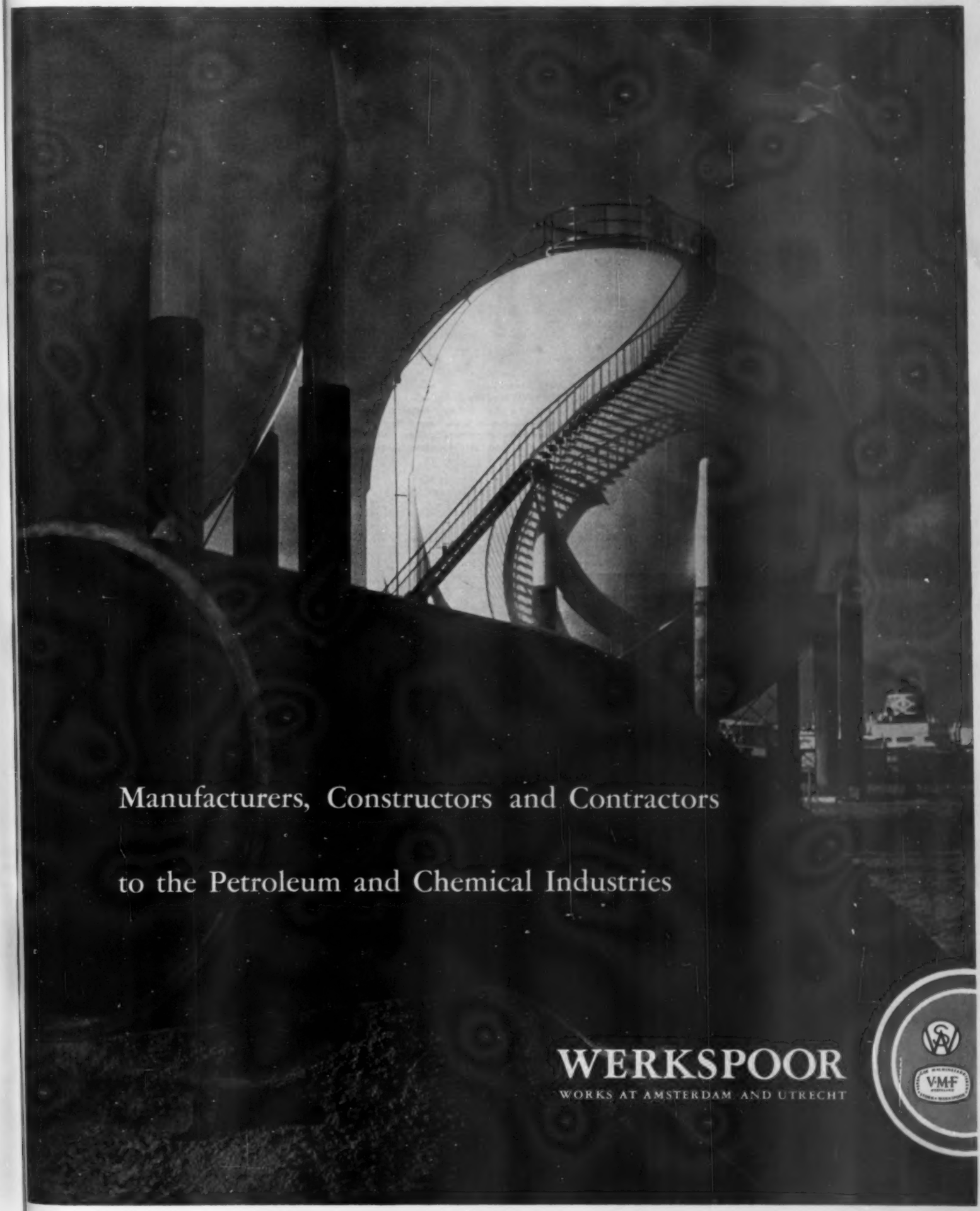

Manufacturers, Constructors and Contractors
to the Petroleum and Chemical Industries
WERKSPOOR
WORKS AT AMSTERDAM AND UTRECHT
VMF

H. V. Flemming

W. E. Scarborough

J. A. Grundy

Dow Warren

Flemming Joins Parsons

The Ralph M. Parsons Co. has appointed Homer V. Flemming manager of its Houston office. He was vice-president in charge of sales for The Refinery Engineering Co., Tulsa, and has accumulated over 25 years in the petrochemical field.

Bethlehem Sales Appointments

C. C. Crider, formerly general manager of stores of the Bethlehem Steel Co.—Supply Division, has been appointed general manager of regions and will continue to make his headquarters at the home office in Tulsa.

The Louisiana Gulf and South Texas districts have been combined under H. L. Hawkinson, Jr. O. H. Crowe, in Beaumont, Texas and W. J. Vark in New Orleans, will be assistants.

The newly formed South Central Region will have its headquarters in Dallas under H. V. Harder. The Mid-States region, comprised of Tennessee, Kentucky, Indiana, Illinois, Missouri, Oklahoma, Kansas and a portion of Nebraska, will have its regional headquarters at Wichita, Kans. under M. R. Griffith. His assistant will be W. T. Davis.

The West Texas, Texas-Panhandle and New Mexico areas have been combined under Arthur Weber, Jr., in Midland, Texas. The Rocky Mountain region including the Four Corners area will be managed by E. S. Lewis.

Reed Directors Elected

The election of Dow Warren and J. A. Grundy as directors of Reed Roller Bit Co. and William E. Scarborough as vice president—Sales, has been announced by John Maher, President. Mr. Warren is administrative vice president and Mr. Grundy is vice president—operations.

Mr. Warren first came to Reed in 1936 but resigned in 1947. He returned to Reed in 1952, served briefly as manufacturing engineer and assistant to the president prior to being elected administrative vice president.

Mr. Grundy joined Reed in 1937 and in 1945 became production manager of the oil tool division and later factory manager.

Mr. Scarborough was appointed domestic sales managed of Reed in July of 1959, the appointment representing a second association with the company, for he was in Reed's engineering department 20 years, leaving in 1956 to join the Security Engineering Corp. in Dallas.

Heads Eastern Hemisphere Sales

Dillard R. Thomas has been appointed division sales manager for the eastern hemisphere by Reed Roller Bit Co. He has been administrative assistant to W. E. Scarborough, Reed's vice president in charge of sales. Mr. Thomas succeeds John Orton, resigned.

Paraffin Inhibitor

A radically new approach to the paraffin problem in wells has been announced by Dowell division of Dow Chemical Co. The technique involves a combination of chemicals and a special preapplication cleaning of metal parts for removal of oil, wax and paint. When this cleaning step has been completed, regular periodic application of the chemicals will make the metal parts of the well water wet and prevent the adhesion of the paraffin particles to the clean, water wet surfaces. Application of the chemicals is done in the same way as other down hole treatments such as demulsifying agents and corrosion inhibitors.

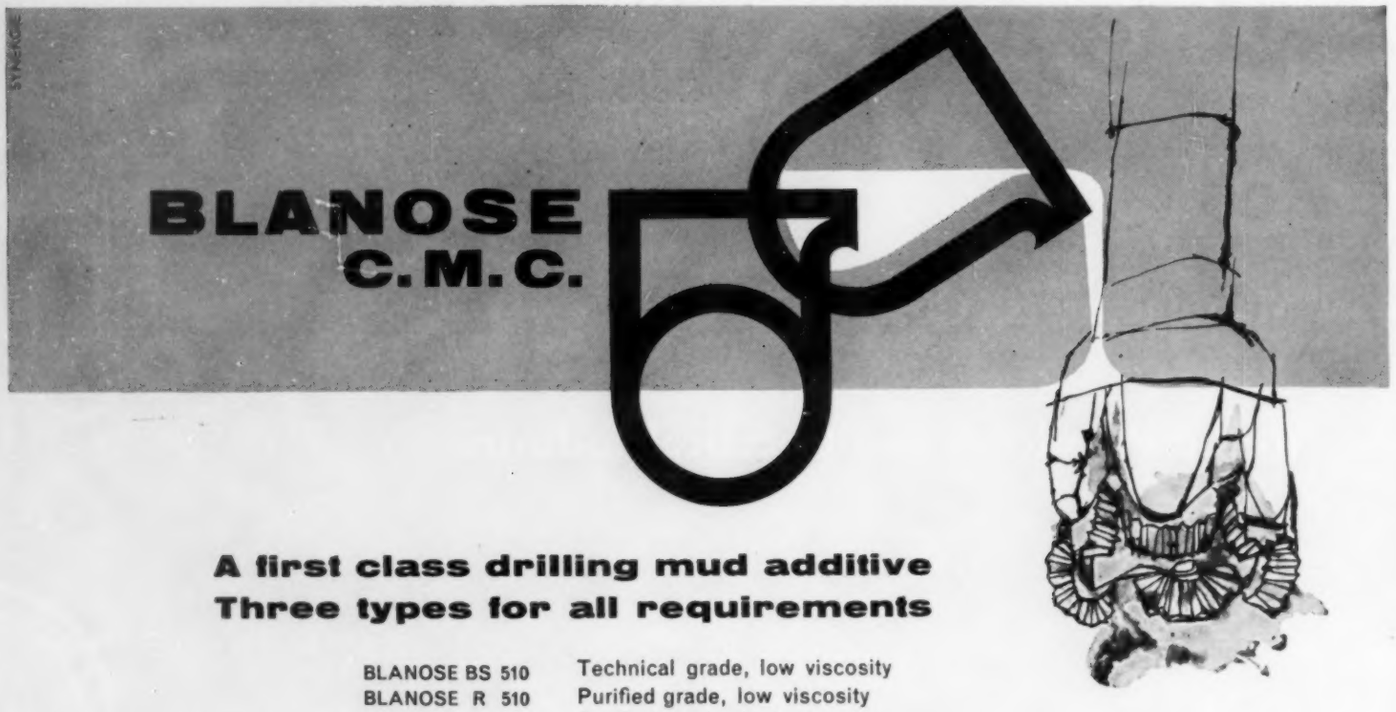
Chiksan Men to France

The Chiksan Co., Brea, Calif., has sent a team of three specialists to assist Luceat S.A., Sens, France, in setting up to manufacture Chiksan products. Frank Burrill, vice president of Chiksan, becomes managing director of the French subsidiary. William A. Schweiss becomes general shop superintendent and Robert J. Bowman, chief draftsman. L. L. Durkin will go to France soon as European sales coordinator.

Largest Diamond Drill Built

Mindrill Ltd., Victoria, Australia, recently completed manufacturing, assembling and testing the largest diamond drill in the world, capable of drilling either vertical or angle holes to depths in excess of 10,000 ft. Initially it will be used for drilling 2¼" holes. It will operate in conjunction with an inclineable frame carrying a head sheave 72' from the base, which permits hoisting 60' lengths of rods.

The hoist, which has a single drum, is designed to give a direct line pull of 50,000 lb with hoisting speeds up to 300 fpm; two powerful 36" diameter x 6" wide brakes operate on the water cooled brake drums of the hoist. The brakes are actuated by springs and released by mechanism operated by two air cylinders and are automatically applied if there is any failure in the air supply. Power is supplied by a 175 hp Cummins Turbo diesel driving through a Rockwell Hydra-Drive. The hoist drive can be completely disengaged during drilling and the head unit disconnected when hoisting.



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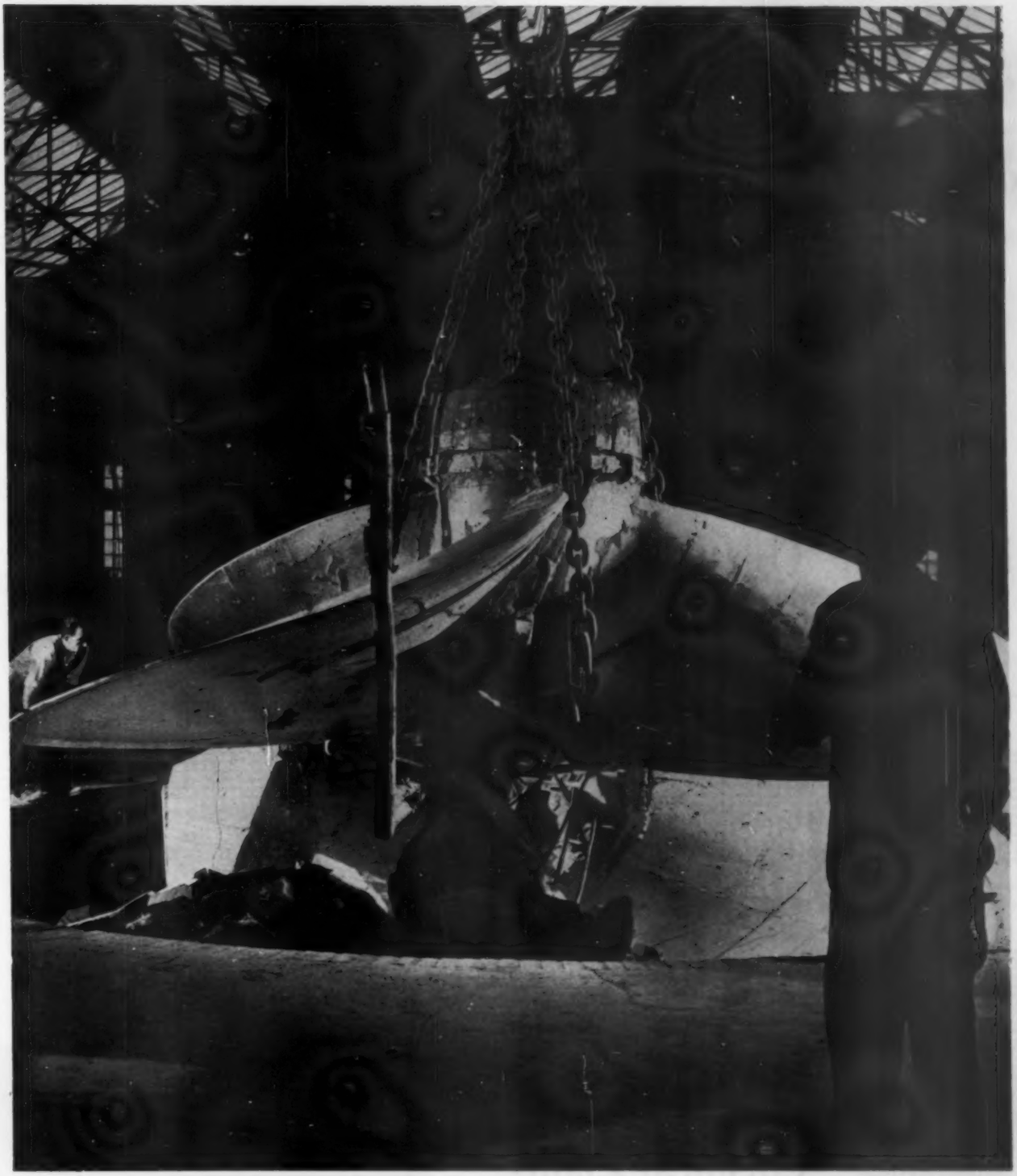

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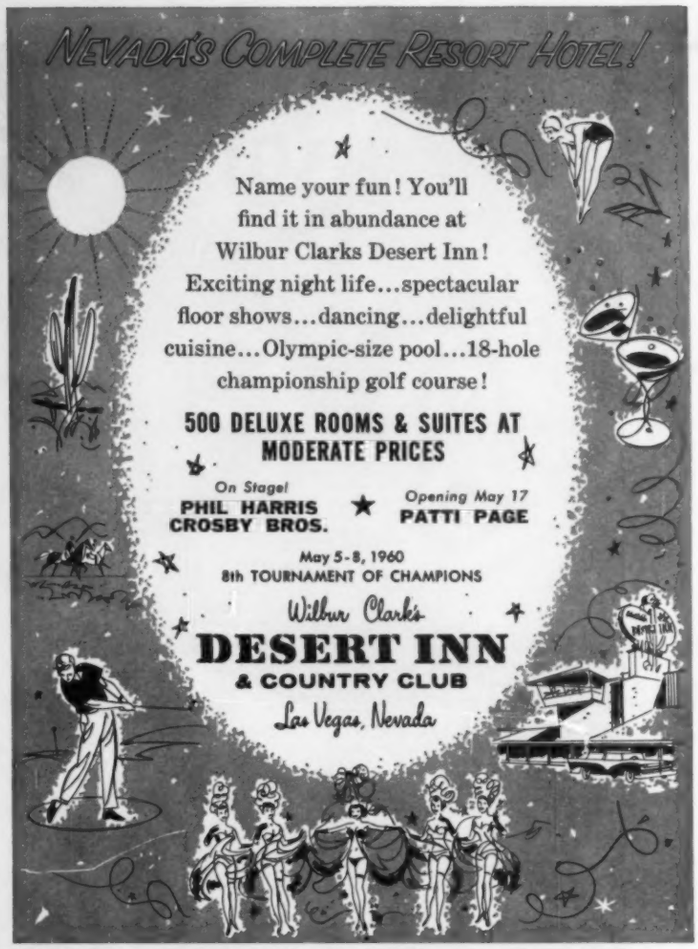
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Completes Aerial Libya Map

Fairchild Aerial Surveys, Inc. has just completed an aerial map of Libya. The survey covers 260,000 square miles of Southern Libya's barren, featureless, wasteland as large as Texas. Flying a specially modified Lockheed Lodestar at altitudes ranging from 23,000′ to 25,000′, the Fairchild crew averaged about 3,000 square miles of photography a day.

"Instant" Concrete Pipe

Construction machinery that builds "instant concrete pipe" in a freshly-cut ditch at a rate of eight to twelve feet a minute has been developed by Fullerton Continuous Pipe Corp. at Phoenix, Ariz.

Using two 300-foot inflated forms with only 3 psi of air pressure, as much as 600 ft of concrete pipe can be poured at a time without interruption. It is possible to line up forms for runs in miles. Ready-mix concrete trucks are used in a continuous stream to service the pouring equipment. The inflatable rubber and fabric forms were designed by Goodyear Aircraft Corp.

International Full-line Folder

A 24-page folder depicting construction equipment has been issued by International Harvester Co.'s construction equipment division. Write International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

Off-Highway Truck

A new 230 series of off-highway heavy-duty International trucks with choice of gasoline, LPG or diesel powered engines has been announced by the International Harvester Export Co. for oil field and similar work. The new series, which includes six basic models in both four-wheel and six-wheel design, offers gross vehicle weight ratings ranging from 46,000 to 73,000 pounds and horsepower from 212 to 257.

Fuel Additives

Tretolite Co. divisions of Petrolite Corp. have published a brochure describing their new line of TOLAD (Reg. T. M.) fuel additives of the inhibitor or preventive type and the inhibitor-dispersant type. Write Tretolite Co. division of Petrolite Corp., 369 Marshall Avenue, St. Louis 19, Mo. or Tretolite Co. of Calif., 5515 Telegraph Road, Los Angeles 22.

Lowe Elected B-I-F- V.P.

Rudy P. Lowe has been elected a vice president of B-I-F Industries. He has been with B-I-F since 1932 and in addition to his new duties as vice president he continues as director of industrial systems sales for the company.

Air-Borne Logging Unit

This is a newly-designed logging unit which can be easily disassembled into component packages of 4,000 pounds or less for airlifting to remote locations by helicopter. The unit may be equipped with instruments to provide all of Schlumberger's logging and completion services. The prototype unit pictured is now being field tested.

Automatic Control Panels

A new series of automatic control panels has been introduced by Clark Bros. Co. to simplify the operation of its packaged field compressors. Consisting of a complete pneumatic starting and stopping system which operates on 75 psi air or gas pressure, the control is furnished as an integral part of the compressor package.

9,000 BHP Gas Turbine

A new open cycle, single shaft gas turbine with a NEMA rating of 9,000 bhp has been introduced by Clark Bros. Co., one of the Dresser Industries. Model 305-S, has been designed to achieve substantial savings in initial cost, transportation, floor space, foundation and installation. It burns either liquid or gaseous fuels and is capable of continuous operation under full load conditions at normal rated speed of 5,000 rpm.

Tests Gas Turbine

Halliburton Oil Well Cementing Co. is testing a newly developed General Electric gas turbine as a prime mover for fracturing service. The turbine is a 900 hp unit which weighs only 1,200 lb and is 7 ft long. Halliburton will operate the unit on test stand for six months starting in May after which it will be mounted on a fracturing truck and sent to the field where it will power a triplex pump delivering 1,100 gpm of oil and sand slurry at pressures up to 8,000 psi. Another small GE turbine will be put in service at a gas pumping station by Trunkline Gas Co., Houston.

Moves California Offices

Waukesha Motor Co. has moved its Los Angeles and Watts, Calif., offices to 5608 Soto St., Huntington Park, where a new building has been erected.

New Fairchild Department

Woods Hinrichs has been named manager of the newly formed exploration services department at Fairchild Aerial Surveys Inc. He will be assisted by William Kellogg who will be chief geophysicist for the department.

Baash-Ross Buys Webb Wilson

Baash-Ross Division of Joy Manufacturing Co., Houston, has purchased Web Wilson Oil Tools, Inc., Los Angeles. W. A. Wilson, president of Web Wilson, will become a divisional vice president and manager of West Coast operations of Baash-Ross. Web Wilson tongs, elevators and hydra-hooks will now carry the Baash-Ross-Web Wilson emblem.

The Baash-Ross division manufactures drill collars, kellys, kelly drive bushings, slips, spiders, liner hangers, cementing equipment, fishing tools, and well head equipment.

B.S. & B. Promotions

J. E. Byers has been promoted to sales manager of the oilfield equipment division and Edward W. Reif placed in charge of sales of the controls division of Black, Sivalls & Bryson, Inc., according to Paul Bartley, vice president and division manager.

Litton Buys Western Geophysical

Western Geophysical Co. has exchanged its stock for common stock of Litton Industries. A privately-held company, Western Geophysical sales totaled $15 million last year. It carries out geophysical exploration assignments in all parts of the world. Western Geophysical, as an operating subsidiary of Litton, will continue with its organizational structure unchanged, with Dean Walling as president and Henry Salvatori as chairman and chief executive officer.

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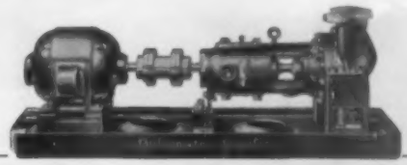

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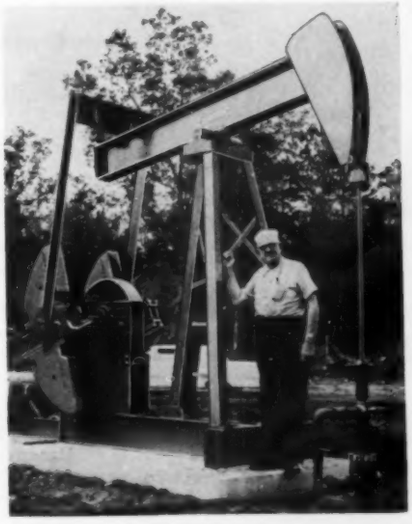

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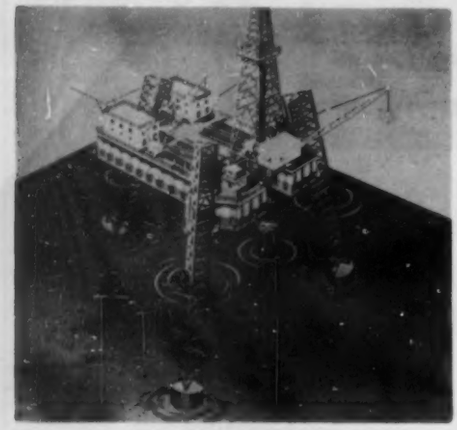
JENSEN JACKS

Dual-Depth Offshore Platform

R. G. LeTourneau, Inc. has designed a new wide base "slant-legged" platform which can be readily modified for greater depths later. As an example, a slant-legged tripod platform for 150 ft of water can be increased to 200-ft depths for only about 6% additional cost.



Offshore platform design with unique slant-legged configuration which provides greatly increased stability for drilling in deep water.

Bowen Itco Buys Kinzbach

Bowen Itco, Inc. has purchased assets of Kinzbach Tool Co., Inc., Houston. Bowen Itco, Inc. has 21 sales, service and warehouse facilities throughout all oil and gas producing areas in this continent and 13 export agents located in strategic oil areas abroad.

Cooper-Bessemer Election

L. L. Warriner has been elected chairman of The Cooper-Bessemer Co. and Grant C. Woodard, general sales manager and Harold C. Johnson, manager of manufacturing, were elected vice presidents.

New Hydrogenation Catalyst

For use in chemical processes requiring a high activity liquid phase hydrogenation catalyst, W. R. Grace & Co. Davison Chemical Division has introduced Davison Palladium-Carbon Catalyst (5% palladium). The catalyst is offered in a standard grade 936, with soda as sodium oxide about 0.6 wt-% and a special low soda grade 937, with about 0.04% sodium oxide. In either grade it is normally supplied as wet cake, about 50% moisture.

J. C. Reed

A. G. Petkus

Procon Promotes Four Executives

Four executives of Procon Incorporated have been promoted by the board of directors. James C. Reed was named executive vice president; Alexander G. Petkus, senior vice president, coordination, engineering and drafting; James R. Britt, vice president, European operations, and Charles B. Robbins, vice president, staff.

J. R. Britt

C. B. Robbins

New Fracturing Chemical

A new chemical that will save operators' money on formation fracturing by cutting horsepower requirements, has been announced by the Dowell division of The Dow Chemical Co., Tulsa. The chemical, a white powder, is used to thicken water used in formation fracturing operations. The material apparently gives an unusual slickness property to the fracturing fluid.

A West Texas well completed at 7,900′ with 2½″ tubing was fractured with the new chemical agent in the fracturing water. Injection rates exceeded 16 bbl/min and the maximum pump pressure required to secure this rate was only 3,300 psi. Had the new agent not been used, the pump pressures would have been above 11,000 psi at the same injection rate. Such pressures would have exceeded the safe limitations on the well equipment.

The Chemical is nontoxic, easy to handle and presents no safety problems. Other addition agents customarily used in fracturing floods can be blended readily into a fracturing fluid made with the new material.

Desert Rig

A mud tank and a substructure that can be operated as trailers are among the unusual features of a completely portable 550-horsepower drilling rig purchased by the International Drilling Co., of The Hague for use in Libya. Both the mud tank and the substructure are equipped with wheels to permit them to be hauled like semi-trailers. However, they may be removed quickly, so that the units rest firmly on the ground for drilling. Other rig components are carried on four semi-trailers. All wheels are equipped with extra-size desert-type tires. The rig is normally considered for drilling in the 4,500 to 7,500-foot depth range.

Rebuilds Salt Dome Structures

The Salt Dome Production Company's portable engine and derrick substructures which felt the full wrath of a blowout while on location in the Gulf of Mexico in 959 have been rebuilt by Avondale Marine Ways at Harvey, La. The badly damaged sections have been updated during the reconstruction work.

Circulating Valves

A new line of Collet Type circulating valves with full circulating capacity has been announced by Garrett Oil Tools, Division of U. S. Industries, Inc. The new valves are wireline operated and allow communication to be established or shut off in a tubing string. Using the internal sliding sleeve design with the sleeve traveling in a one-piece body, the Garrett circulating valve features all sealing on one plane, eliminating the possibility of pressure lock or pressure shifting. As a further safety feature, all screwed joints have triple seals with tapered threads that insure positive locking. O-ring type seals resist foreign material and provide positive sealing under all well conditions.

Kendavis Industries Promotions

Kendavis Industries, Inc., International, has named Murl C. Cornish as vice president and comptroller and Goldie E. Larkin as director of automatic accounting.

Golden Anniversary

International Harvester Company's tractor works is celebrating its 50th anniversary of tractor production. The works went into business in 1910 with the building of 17 huge, friction-drive wheel tractors. These were fabricated partly in a tent and partly in a barn with the help of 196 employes.

New Dowell Research Director

A. F. Beale, Jr. was appointed director of research for Dowell Division of Dow Chemical. He succeeds Dr. W. W. Love, who becomes research consultant. Mr. Beale has been with Dowell since 1953, and Dr. Love since 1934.

Kellogg Appoints Research Chemist

The M. W. Kellogg Co., New York has appointed Charles Lurie as research chemist at its research and development laboratories, Jersey City, N. J.

Parkersburg Reorganizes Sales

The Parkersburg Rig & Reel Co. has set up new sales divisions in Los Angeles, Denver, Calgary, Tulsa, Midland and Dallas. Additional division offices are located in Parkersburg, W. Va., and Houston. Managers are: C. E. Hall, Los Angeles; W. J. Slaughter, Denver; M. L. McLafferty, Calgary; C. M. Ferguson, Tulsa; R. H. White, Midland; G. W. Hendricks, Dallas. J. M. Baldridge continues as manager in Houston and L. R. Latimer in Parkersburg.

CAPT. GEO. E. BRIDGETT

Capt. George E. Bridgett, who was retired by Esso Standard Oil Co. in 1927, died in San Francisco at the age of 97. When he was 80 he falsified his age, passed a physical examination and was given command of the Pierre S. du Pont, a Liberty ship, during World War II. His ship took aviation gasoline and explosives to British forces in the Middle East and circled the globe before Captain Bridgett gave up its command. Later he was trial skipper for about 30 new destroyers, then returned to retirement. Born in Nottingham, England, he ran away to sea at 14. His first seagoing career lasted 51 years and he added two more during the war.

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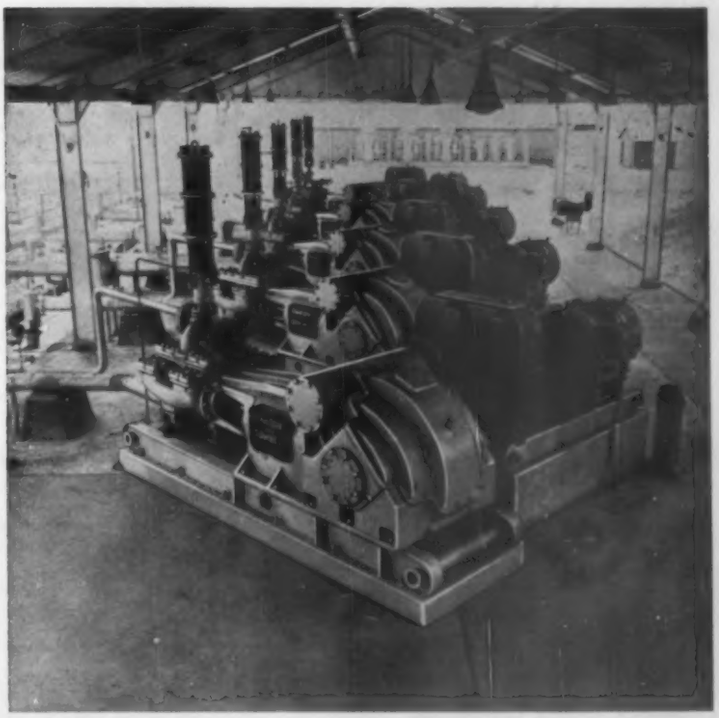

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